



CHEMISTRY

JEE (MAIN AND ADVANCED) CHEMISTRY

VIA GROUP ELEMENTS

PROBLEMS

1. What is the percentage make up of most abundant element in the most abundant liquid of the earth's crust?

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2. Oxygen is a gas, but other elements of group 16 are solids at room temperature. Why?

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3. First and second electron gain enthalpies of oxygen are -141 and $+702\text{kJmol}^{-1}$ How is large number of oxides accounted for ?



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4. Viscosity of sulphur increases when molten sulphur is heated from 120°C to 160°C . Why



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5. What are the oxidation numbers exhibited by oxygen?



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6. Comment on the catenation capacity of sulphur.



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7. What is the maximum covalency of oxygen ? Give examples.



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8. The dissociation constants of H_2O , H_2S , H_2Se are 1.8×10^{-6} , 1.4×10^{-16} , 1.3×10^{-7} and 2.2×10^{-5} , respectively. What do these values denote?



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9. The K_a values also denote that OH^- is a stronger base and TeH^- is a weaker base.



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10. Oxygen forms only fluorides, but other chalcogens form different halides. Why?



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11. Dry sulphurdioxide does not bleach dry flowers. Explain.



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12. A and B are elements with atomic numbers 16 and 17. Write different combinations of binary compounds known from them.



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13. Which oxyacid of sulphur has S - O - S link ? How is it prepared?



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14. Oxygen is divalent in its compounds, but sulphur is even hexavalent. Why?



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15. Write the tautomerism in sulphurous acid.



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16. Justify that peroxymono and peroxydisulphuric acids have a peroxy linkage. How are they structurally different?



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17. Protocity of sulphuric acid is two. Explain?



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18. Write the structure and oxidation numbers of sulphur in tetrathionic acid.



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SUBJECTIVE EXERCISE - 1(LONG ANSWER QUESTIONS)

1. Discuss the general characteristics of Group - 15 elements with reference to their electronic configuration, oxidation state, atomic size, ionization enthalpy and electronegativity.



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SUBJECTIVE EXERCISE - 1(SHORT ANSWER QUESTIONS)

1. Discuss the electronic configuration of group 16 elements.



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2. Write the trends in atomic radius, ionisation potential and metallic nature of group VIA elements.



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3. Write a short note on the allotropy of sulphur.



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4. Discuss the valency and bonding in oxygen and sulphur molecules



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5. Why oxidation states of sulphur are all even numbers ?



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SUBJECTIVE EXERCISE - 1(VERY SHORT ANSWER QUESTIONS)

1. What are the elements of VIA group ? Write their valency shell electronic configurations



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2. Why are group - 16 elements called chalcogens ?



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3. Write the structure of gaseous sulphur molecule at low temperatures.



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4. Explain the different oxidation states of S in terms of its electronic configuration.



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5. What the oxidation states of oxygen ? Why does it not show higher oxidation states like +4 or +5?



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6. What is allotropy ? Give the allotropes of oxygen.



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7. Write the names of the allotropic forms of sulphur.



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8. Compare the electron affinity of oxygen with sulphur.



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9. What is transition temperature ?



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SUBJECTIVE EXERCISE - 2(SHORT ANSWER QUESTIONS)

1. Write on the stability and acidic nature of hydrides of chalcogens.



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2. Water is a liquid and abnormally has low volatility. Explain.



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3. How are oxides of sulphur prepared ? What are their properties?



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4. Discuss the structures of sulphur dioxide and sulphur trioxide molecules.



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5. How are fluorides of oxygen prepared ? Write their structures.



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6. Mention the preparation and discuss the structures of S_2Cl_2 , SF_2 , SF_4 and SF_6 .



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7. What are the hydrides of chalcogens ? How do you prepare them in the laboratory?



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8. Why the bond angles in H_2O & H_2S are different ? Give reason.



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SUBJECTIVE EXERCISE - 2 (VERY SHORT ANSWER QUESTIONS)

1. Write the names and formulae of the hydrides of oxygen.



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2. At room temperature H_2O is a liquid while H_2S is a gas. Explain.



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3. How does the stability of the hydrides of chalcogens vary ? Explain.



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4. What is the shape of H_2S molecule ? What kind of hybridization is undergone by S in it ?



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5. What are the bond angles in H_2O and H_2S ? Why they differ in their bond angles even though the central atoms exhibit same hybridisations.



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6. What are the shapes of SO_2 and SO_3 molecules ? Give the hybridizations in them.



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7. What are the products of hydrolysis of $SiCl_4$? Give the necessary equations.



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8. Which is more reactive SF_6 or TeF_6 ?



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9. What happens when tellurium tetrahalide is hydrolysed ?



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SUBJECTIVE EXERCISE - 3(SHORT ANSWER QUESTIONS)

1. Mention the four types of oxyacids of sulphur and give examples.



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2. Draw the structures of sulphite and sulphate.



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3. Write the peroxy acids and polythionic acids of sulphur.



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4. How is oxygen different from other elements of the same group ? What are the reasons ?



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SUBJECTIVE EXERCISE - 3(VERY SHORT ANSWER QUESTIONS)

1. Give any two oxo acids of S in its $+IV$ and $+VI$ states.



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2. Write the structural formulae of

(i) Sulphurous acid (H_2SO_3) and

(ii) Sulphuric acid (H_2SO_4)



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3. What are the oxidation states of sulphur atoms in peroxy sulphuric acids?



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OBJECTIVE EXERCISE - 1 (GENERAL CHARACTERISTICS)

1. Which of the following set of atomic numbers belongs to group 16 elements ?

A. 56, 37, 20

B. 52, 8, 84

C. 14, 32, 50

D. 36, 9, 17

Answer: B



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2. Oxygen and Sulphur have same

A. outer electronic configuration

B. Atomic size

C. electronic configuration

D. electron affinity

Answer: A



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3. Element with the lowest atomicity

A. Te

B. S

C. Se

D. O

Answer: D



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4. The number of atoms present in one molecule of rhombic sulphur is

A. 2

B. 4

C. 6

D. 8

Answer: D



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5. The total number of covalent bonds present in one S_8 molecule is

A. 4

B. 6

C. 8

D. 10

Answer: C



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6. The S - S - S bond angle in S_8 molecule is

A. 109.5°

B. 105°

C. 120°

D. 60°

Answer: B



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7. The decreasing tendency to exist in puckered 8 - membered ring structure is

A. $S > Se > Te > Po$

B. $Se > S > Te > Po$

C. $S > Te > Se > Po$

D. $Te > Se > S > Po$

Answer: A



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8. S_2 molecule in vapour state is paramagnetic due to the presence of unpaired electrons is

- A. Bonding bonding σ orbitals
- B. Anti bonding σ^* orbitals
- C. Anti bonding π^* orbitals
- D. Bonding π orbitals

Answer: C



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9. α , β and γ forms of sulphur differ in

- A. Overall packing of rings
- B. Molecular weight
- C. Atomicities

D. Their ring structure

Answer: A



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10. The oxidation state of oxygen is zero in

A. CO

B. O_3

C. SO_2

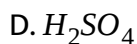
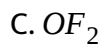
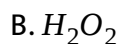
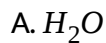
D. H_2O_2

Answer: B



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11. In which of the following compounds, oxygen exhibits +2 oxidation state ?



Answer: C



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12. Which of the following element does not show an oxidation state of +4 ?

A. Oxygen

B. Sulphur

C. Selenium

D. Tellurium

Answer: A



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13. Generally oxygen is converted into its ion by

- A. Losing electrons
- B. Increasing oxidation number
- C. Decreasing atomic size
- D. Gaining electrons

Answer: D



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14. If X is a member of chalcogen family, the highest stability of X^{-2} is exhibited by

- A. Oxygen
- B. Selenium
- C. Tellurium
- D. Sulphur

Answer: A



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15. Oxygen is always divalent while sulphur can form 2, 4 and 6 bonds because

- A. Oxygen is more electronegative than sulphur
- B. Sulphur has vacant d-orbitals while oxygen does not
- C. Sulphur has large atomic radius than oxygen

D. Sulphur is more electronegative than oxygen.

Answer: B



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16. In sulphate ion the oxidation state of sulphur is +6 and the hybridization state of sulphur is

A. sp

B. sp^2

C. sp^3

D. sp^2 or sp^3d^2

Answer: C



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17. The second most electronegative element in periodic table is

A. F

B. O

C. Cl

D. N

Answer: B



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18. Which of the following has higher IP ?

A. Oxygen

B. Sulphur

C. Selenium

D. Tellurium

Answer: A



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19. Element with higher catenation capacity is

A. S

B. Se

C. Te

D. Po

Answer: A



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20. The order of electron gain enthalpy of VI A group elements is

A. $S > Se > Te > Po > O$

B. $S > Se > Te > O > Po$

C. $O > Se > S > Te > Po$

D. $O > Te > Se > S > Po$

Answer: A



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21. The most common oxidation state of VI A group elements is

A. -2

B. +2

C. +4

D. +6

Answer: A



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22. Chair form of S_6 rings are present in

- A. α - sulphur
- B. β - sulphur
- C. Engle's sulphur
- D. γ - sulphur

Answer: C



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OBJECTIVE EXERCISE - 1 (HYDRIDES)

1. The pair of exothermic hydrides of VI A group are

- A. H_2O, H_2S
- B. H_2O, H_2Se
- C. H_2Se, H_2Te

D. H_2S , H_2Te

Answer: A



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2. Which is non poisonous hydride ?

A. sp^3

B. sp^2

C. H_2Se

D. H_2Te

Answer: A



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3. Sulphur uses orbitals for bonding in H_2S

A. sp^3

B. sp^2

C. one s and one p

D. pure p orbitals

Answer: D



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4. A stronger reducing agent is

A. H_2O

B. H_2S

C. H_2Se

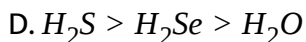
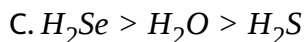
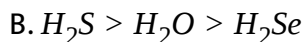
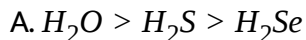
D. H_2Te

Answer: D



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5. Correct decreasing order of volatility is

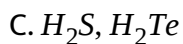
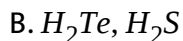
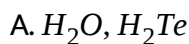


Answer: D



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6. The most acidic and thermally stable hydride of chalcogens are respectively



D. H_2Te, H_2O

Answer: D



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7. In the hydrides of VIA elements largest bond angle and bond length is observed respectively in

A. H_2O, H_2O

B. H_2Po, H_2O

C. H_2O, H_2Po

D. H_2S, H_2Se

Answer: C



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8. The effect of repulsion between the two lone pairs of electrons present on oxygen in H_2O molecule is

- A. no change in $H - O - H$ bond angle
- B. increase in $H - O - H$ bond angle
- C. decrease in $H - O - H$ bond angle
- D. all atoms will be in one plane

Answer: C



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9. Which of the following is a weakest acid in its aqueous solution ?

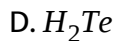
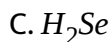
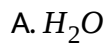
- A. H_2Te
- B. H_2Se
- C. H_2S
- D. H_2Po

Answer: C



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10. Which of the following is least covalent hydride?

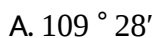


Answer: A



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11. The bond angle in H_2S is



B. $104^{\circ} 51'$

C. 120°

D. 92.5°

Answer: D



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OBJECTIVE EXERCISE - 1 (HALIDES AND OXIDES)

1. The element of VI A group which cannot form hexahalides is

A. O

B. S

C. Se

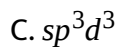
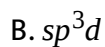
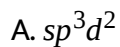
D. Te

Answer: A



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2. The hybridization of $\text{Si in } \text{SF}_4$ is

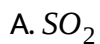


Answer: B



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3. The least stable dioxide of group 16 elements is



D. PoO_2

Answer: D



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4. The oxide obtained in the roasting of ironpyrites

A. SO_2

B. SO_3

C. FeO

D. SO_2 and SO_3

Answer: A



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5. Among hexahalides of VIA group, the stable halides are

- A. hexa iodides
- B. hexa bromides
- C. hexa chlorides
- D. hexa fluorides

Answer: D



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6. SO_2 bleaches by

- A. Reduction
- B. Oxidation
- C. Hydrolysis
- D. Acidic nature

Answer: A



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7. The hybridization of sulphur in SO_2 is:

A. sp

B. sp^3

C. sp^2

D. dsp^2

Answer: C



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8. In SO_2 two oxygen atoms are linked to the sulphur atom through double bonds. The two π bonds are

A. bond $p_\pi - p_\pi$

B. both $p_\pi - d_\pi$

C. both $d_\pi - d_\pi$

D. one $d_{\pi} - p_{\pi}$ and one $p_{\pi} - p_{\pi}$

Answer: D



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9. SO_2 forms an addition compound sulphuryl chloride with Cl_2 in presence of

A. Charcoal

B. CCl_4

C. $H^+ / K_2Cr_2O_7$

D. $H^+ / KMnO_4$

Answer: A



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10. In $HO - \overset{\overset{O}{||}}{S} - OH$ the oxidation states of S are

A. +4, - 2

B. +4, 0

C. +2, - 2

D. +4, - 4

Answer: A



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11. Acid that contains S - O - S linkage is

A. $H_2S_2O_7$

B. $H_2S_2O_5$

C. $H_2S_2O_6$

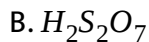
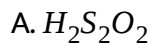
D. $H_2S_2O_4$

Answer: A

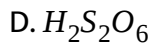


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12. Which of the following has S - S bond ?



C. mustard gas

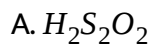


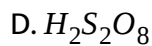
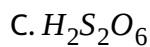
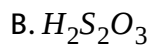
Answer: D



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13. Peroxy linkage is present in



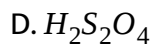
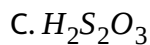
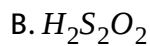
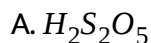


Answer: D



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14. Pyrosulphurous acid is



Answer: A



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15. Basicity of any oxyacid of sulphur is

A. 3

B. 4

C. 2

D. 1

Answer: C



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16. Partial neutralisation of sulphuric acid gives

A. Sulphites

B. Bisulphates

C. Sulphates

D. Bisulphites

Answer: B



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17. Hybridisation of central sulphur in all oxo anions of sulphur is

A. sp^3d

B. sp^3

C. sp^3d^2

D. sp^2d

Answer: B



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18. What is the number of sigma and pi bonds present in H_2SO_4 molecule ?

A. 6σ and 2π

B. 6σ and 0π

C. 2σ and 4π

D. 2σ and 2π

Answer: A



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19. Permonosulphuric acid is known as

A. Marshall's acid

B. Caro's acid

C. Sulphuric acid

D. Sulphurous acid Ozone

Answer: B



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OBJECTIVE EXERCISE - 1 (OZONE)

1. The formation of O_3 from O_2 is

- A. exothermic and reversible
- B. endothermic and irreversible
- C. endothermic and reversible
- D. exothermic and spontaneous

Answer: C



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2. O_3 is prepared by subjecting O_2 to silent electric discharge. The favourable conditions for the formation of ozone according to Le-chatlier's principle are

- A. low temperature, low pressure
- B. high temperature, high pressure
- C. low temperature, high pressure
- D. high temperature, low pressure

Answer: B



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3. Mercury sticks to glass when it comes in contact with

- A. H_2O
- B. HNO_3
- C. I_3
- D. O_3

Answer: D



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4. Decomposition of Ozone into Oxygen has

A. $\Delta H = -ve$

B. $\Delta S = -ve$

C. $\Delta H = +ve$

D. All of these

Answer: A



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5. Dry bleaching agent is



D. H_2O_2

Answer: A



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6. A black compound 'X' when treated with O_3 turned white. The compound 'X' is

A. ZnS

B. PbS

C. CuS

D. Ag_2S

Answer: B



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7. The O - O bond length in Ozone is

A. 1.33\AA

B. 1.28\AA

C. 1.48\AA

D. 1.39\AA

Answer: B



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8. With respect to both oxygen and ozone, which one of the following statements is not correct?

A. They are allotropes together

B. oxygen is colourless while ozone is coloured

C. valency of oxygen is 2 in both

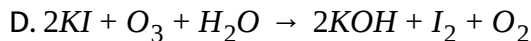
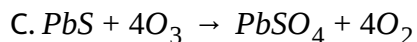
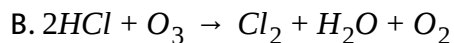
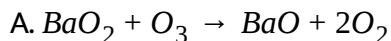
D. oxygen has 2 bonds and ozone has 3 bonds

Answer: C



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9. In which of the following reactions ozone acts as a reducing agent?

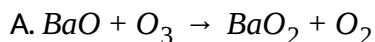


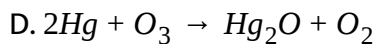
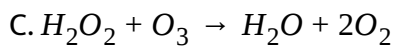
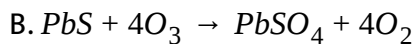
Answer: A



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10. Which one of the following reactions does not occur ?





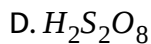
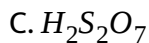
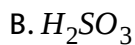
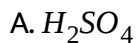
Answer: A



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OBJECTIVE EXERCISE - 1 (SULPHURIC ACID)

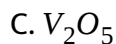
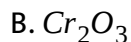
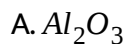
1. Oil of vitriol is



Answer: A

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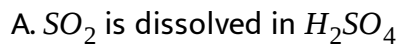
2. The catalyst used in the manufacture of sulphuric acid by contact process is



Answer: C

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3. In the preparation of H_2SO_4



C. SO_3 is dissolved in conc. H_2SO_4

D. SO_3 is dissolved in dilute H_2SO_4

Answer: C



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4. Poison for platinum, a catalyst in Contact process is

A. S

B. P

C. As

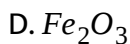
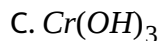
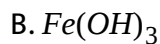
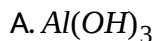
D. C

Answer: C



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5. In Contact process impurities of arsenic are removed by:



Answer: B



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6. Oleum or fuming H_2SO_4 is

A. A mixture of conc. H_2SO_4 and oil

B. Sulphuric acid which gives fumes of sulphur dioxide

C. Sulphuric acid saturated with sulphur trioxide, i.e., $H_2S_2O_7$

D. A mixture of sulphuric acid and nitric acid

Answer: C



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7. The common impurity in sulphur dioxide used in contact process

A. SO_3

B. CO_2

C. As

D. As_2O_3

Answer: D



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8. Practical pressure utilised in contact tower

A. 2 bar

- B. 0.2 bar
- C. 20 bar
- D. 200 bar

Answer: A



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9. Hypo is a salt of the oxyacid

- A. thiosulphuric acid
- B. Thiosulphurous acid
- C. dithionous acid
- D. dithionic acid

Answer: A



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OBJECTIVE EXERCISE - 1 (ASSERTION AND REASON TYPE)

1. (A): Thermal stability of the hydrides of VIA group elements decreases from $H_2O \rightarrow H_2Po$

(R): The heats of dissociation of M-H bond of hydrides of VIA group decreases down the group

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: A



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2. (A): H_2O is thermally more stable than H_2S

(R): H_2O molecules can form inter-molecular hydrogen bonds whereas

H_2S molecules can not.

- A. Both A & R are true, R is the correct explanation of A
- B. Both A & R are true, R is not correct explanation of A
- C. A is true, R is false
- D. A is false, R is true

Answer: B



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3. (A): Direct absorption of SO_3 in H_2O is commercially not possible

(R): Direct absorption of SO_3 in water forms a mist of corrosive vapours.

- A. Both A & R are true, R is the correct explanation of A
- B. Both A & R are true, R is not correct explanation of A
- C. A is true, R is false
- D. A is false, R is true

Answer: A



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4. (A) The formation of SO_3 by contact process is an example of heterogeneous catalysis

(R): The reactants and product are in different phase in the formation of SO_3 by contact process

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: C



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5. (A): Oxygen has highest tendency, among chalcogens, to form dinegative ion

(R): Electron affinity of oxygen is highest among chalcogens

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: C



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6. (A): Diatomic sulphur has a dicovalent bond

(R): Maximum valency of sulphur is six

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: B



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7. (A): Water forms hydronium ion in acid solutions

(R): The maximum covalency of oxygen is three

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: A



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8. (A): Sulphur is hexavalent in the ground state

(R): Sulphur can form a minimum of six bonds

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: D



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9. (A): Oxygen exhibits positive oxidation states in some of its compounds

(R): In binary fluorides, fluorine is always more electronegative

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: A



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10. (A): Ozone is an allotrope of oxygen.

(R): Ozone is better oxidising agent as compared with oxygen.

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: B



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11. (A): Catanation ability of sulphur is observed in polysulphides

(R): A polysulphide with eight sulphur atoms is known

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: C



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12. (A): Water is the most stable hydride of chalcogens

(R): Among M-H bonds of chalcogen hydrides, O - H bond is more stable.

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: A



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13. (A): Ozone can be used qualitatively to distinguish unsaturated hydrocarbons from saturated

(R): Ozonides are formed with unsaturated hydrocarbons

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: D



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14. (A): $\text{Conc. H}_2\text{SO}_4$ reacts with KCl to give Cl_2 gas

(R): HCl cannot be oxidised by $\text{conc. H}_2\text{SO}_4$

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: D



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15. (A): SO_3 molecule has a planar structure

(R) : S atom in SO_3 is sp^2 - hybridized and $\text{O} - \text{S} - \text{O}$ bond angle is 120°

A. Both A & R are true, R is the correct explanation of A

B. Both A & R are true, R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: A



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OBJECTIVE EXERCISE - 2 (GENERAL CHARACTERISTICS)

1. Name the most abundant element present in earth's crust.

A. O

B. Se

C. S

D. Te

Answer: A



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LIST - I

LIST - 2

A) Gypsum

1) PbS

B) Baryts

2) ZnS

2. C) Galena

3) BaSO_4

D) Zinc blende

4) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

5) Fe_3O_4

The correct match is

A.

A	B	C	D
4	5	1	3

B.

A	B	C	D
3	5	1	2

C.

A	B	C	D
4	3	1	2

D.

A	B	C	D
3	4	1	2

Answer: C



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3. Oxygen exhibits least oxidation state in

A. OF_2

B. KO_2

C. H_2O

D. H_2O_2

Answer: C



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4. Polyanion formation is maximum in

A. Nitrogen

B. Oxygen

C. Sulphur

D. Boron

Answer: C



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5. In a compound of sulphur, the sulphur atom is in second excited state.

The possible hybridisation of sulphur is

A. sp^2

B. sp^3

C. sp^3d^2

D. sp^2 (or) sp^3 (or) sp^3d^2

Answer: D



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6. Which of the following has strong metallic interactions ?

A. O

B. Se

C. Se

D. Te

Answer: D



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OBJECTIVE EXERCISE - 2 (HYDRIDES)

1. Among the following, the weakest conjugate base is



Answer: D



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2. The geometry of H_2S and its dipole moment are

A. Angular and non zero

B. Angular and zero

C. Linear and non zero

D. Linear and zero

Answer: A



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3. In which of the following bond angle can not be explained by Valence Bond Theory?

A. H_2O

B. H_2Po

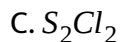
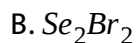
C. H_2S

D. H_2Te

Answer: A

OBJECTIVE EXERCISE - 2 (HALIDES AND OXIDES)

1. Which among the following compound cannot be prepared by direct union of elements ?



Answer: D

2. The shape of sulphur hexafluoride molecule is

- A. Tetrahedral
- B. Square planar
- C. pyramidal
- D. Octahedral

Answer: D



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3. Which of the following can give an oxyacid when dissolved in H_2O ?

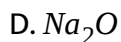
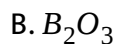
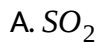
- A. Cl_2O
- B. SO_3
- C. SO_2
- D. All

Answer: D



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4. Which is an amphoteric oxide ?

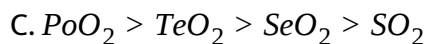
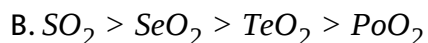
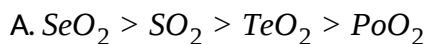


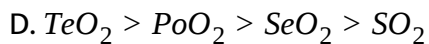
Answer: C



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5. The acidic character of dioxides of members of oxygen family decreases in the order



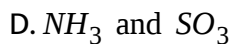
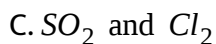
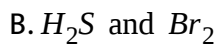
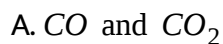


Answer: B



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6. One gas bleaches the colour of the flowers by reduction while the other by oxidation in the presence of moisture. The gases are



Answer: C



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7. When moist coloured flowers are added into SO_2 gas the flowers are decolourised because

- A. SO_2 absorbs colouring matter
- B. SO_2 oxidised vegetable colouring matter
- C. SO_2 reduces vegetable colouring matter
- D. SO_2 gives colourless product

Answer: C



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8. Sulphurous anhydride is

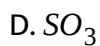
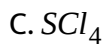
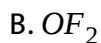
- A. SO_2
- B. SO_3
- C. HSO_3^-
- D. SO_3^{2-}

Answer: A



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9. Which of the following dissolves in water but does not give any oxyacid solution ?



Answer: B



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OBJECTIVE EXERCISE - 2 (OXYACIDS)

1. Which of the following has S - O - S bond in it is

A. pyrosulphurous acid

B. Oleum

C. Caro's acid

D. Marshal's acid

Answer: B



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2. The ratio of $p_{\pi} - d_{\pi}$ bonds is SO_2 and SO_3 molecules

A. 1:1

B. 1:2

C. 2:1

D. 2:3

Answer: B



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3. A salt of sulphurous acid is called

- A. Sulphate
- B. Sulphurate
- C. Sullphite
- D. Sulphide

Answer: C



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LIST - 1 LIST - 2

A) H_2SO_4 1) +4

B) $H_2(S)_nO_6$ 2) +3

4. C) H_2SO_3 3) +2, - 2

D) H_2SO_3 4) +6

5) +5,0

The correct match is

A. A B C D
 2 5 2 4

B. A B C D
 3 2 1 4

C. A B C D
 4 5 1 2

D. A B C D
 2 3 1 5

Answer: C



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5. Number of hydroxyl groups present in pyrosulphuric acid is

A. 3

B. 4

C. 2

D. 1

Answer: C



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6. The acid containing S - O - O - S bond is

A. H_2SO_5

B. $H_2S_2O_7$

C. $H_2S_2O_6$

D. $H_2S_2O_8$

Answer: D



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7. S - S bond is not present in

A. Pyro sulphurous acid

B. Dithionic acid

C. Dithionous acid

D. Pyro sulphuric acid

Answer: D



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8. Oxidation state of S in H_2SO_5 and $H_2S_2O_8$ respectively are

A. +6, +6

B. +6, +4

C. +8, 7

D. +4, +4

Answer: A



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9. Iron sulphide is heated in air to form A, an oxide of sulphur. A is dissolved in water to give an acid. The basicity of this acid is

A. 2

B. 3

C. 1

D. zero

Answer: A



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10. Identify the correct sequence of increasing number of π - bonds in the structures of the following molecules. I $H_2S_2O_6$ II H_2SO_3 III. $H_2S_2O_5$

A. I, II, III

B. II, III, I

C. II, I, III

D. I, III, II

Answer: B



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OBJECTIVE EXERCISE - 2 (OZONE)

1. The number of sigma and pi bonds in peroxodisulphuric acid are, respectively.

A. 9 and 4

B. 11 and 4

C. 4 and 8

D. 4 and 9

Answer: B



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2. Select the wrong statement

- A. Ozone is a pale blue gas
- B. O_3 acts as both oxidant and reductant
- C. Ozone is used as an antiseptic inhaler
- D. Ozone is used in sterilization of water

Answer: C



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3. Pure ozone is

- A. Pale blue gas

- B. Dark blue liquid
- C. Violet black solid
- D. All the above

Answer: D



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4. The incorrect statement among the following

- A. Ozone is an angular molecule
- B. O_3 is a poisonous gas
- C. O_3 is highly soluble in water
- D. Ozone is present in stratosphere

Answer: C



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5. Which of the following conversion is not brought about by ozone ?

A. HF to F_2

B. Moist KI to I_2

C. Ag_2O to Ag

D. PbS to $PbSO_4$

Answer: A



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6. Number of volumes of Oxygen that gives 4 volumes of Ozone is

A. 4

B. 6

C. 8

D. 2

Answer: B



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7. Starch paper moistened with KI solution turns blue in ozone because of

- A. Iodine liberation
- B. Oxygen liberation
- C. Alkali formation
- D. Ozone is acidic

Answer: A



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8. Higher concentrations of ozone is characterised as

- A. Dangerously explosive

- B. Harmless gas
- C. Both (1) and (2)
- D. None of these

Answer: A



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9. Which of the following is not correct?

- A. $2O_2 \xrightarrow[\text{discharge}]{\text{Silent electric}} 2O_3, \Delta H = -284.5 \text{ KJ}$
- B. Ozone undergoes addition reaction with unsaturated carbon compounds.
- C. Nitrogen oxides emitted from jet planes might be slowly depleting ozone.
- D. Ozone oxidises lead sulphide to lead sulphate

Answer: A



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10. Ethylene on reaction with ozone gives

- A. Glyoxal
- B. Formaldehyde
- C. Ethylene ozonide
- D. Acetaldehyde Sulphuric acid

Answer: C



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OBJECTIVE EXERCISE - 2 (SULPHURIC ACID)

1. Which characteristic property of H_2SO_4 is responsible for its chemical properties

- A. low boiling point
- B. weak acidic nature
- C. acting as reductant
- D. affinity for water

Answer: D



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2. Pick out the ideal condition for H_2SO_4 manufactured by Contact process

- A. Low temperature, high pressure and high concentration of reactants
- B. Low temperature, low pressure and low concentration of reactants
- C. High temperature, high pressure and high concentration of reactants

D. Low temperature, low pressure and high concentration of reactants

Answer: A



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PRACTICE EXERCISE

1. The chalcogen containing equal number of 's' and 'p' electrons is

A. O

B. S

C. Mg

D. Te

Answer: A



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2. Oxygen cannot exhibit higher oxidation states due to

- A. small size
- B. more electronegativity
- C. less density
- D. absence of d' orbitals

Answer: D



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3. Magnetic moment of O_2 is nearly

- A. 1.8 BM
- B. 2.8 BM
- C. 3.8 BM
- D. Zero

Answer: B



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4. The oxidation numbers of sulphur in S_8 , SO_2 and H_2S respectively are

(M-2010 & IIT 1999)

A. 0, + 4 and - 2

B. +2, + 4 and - 2

C. 0, + 4 and + 2

D. -2, + 4 and - 2

Answer: A



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5. The pair of VI A group elements available in native state is

A. S, Po

B. S, Se

C. Te, Po

D. O, S

Answer: D



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6. In the hydrides of VI A group elements the boiling point increases from H_2S to H_2Po . It is because of increase in the

A. size of atoms

B. Stability

C. atomic weight of chalcogens

D. Acidic nature

Answer: C



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7. In the hydrides of VI A group elements, the acidic strength gradually increases from top to bottom. This is due to

- A. decrease in the EN of the chalcogens
- B. increase in their K_a values
- C. increase in the metallic strength of chalcogen
- D. increase in the m.p. of chalcogen

Answer: B



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8. Oxygen is more electronegative than sulphur, yet H_2S is acidic while H_2O is neutral. This is because

- A. Water is a highly associated compound

B. $H - S$ bond is weaker than $H - O$ bond

C. H_2S is a gas while H_2O is a liquid

D. The molecular weight of H_2S is more

Answer: B



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9. SF_4 is obtained by treating sulphur with

A. F_2

B. CoF_2

C. CoF_3

D. CoF_6^{3-}

Answer: C



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10. Oxidation state of S in compound 'Z' is

A. +1

B. +4

C. +6

D. +2

Answer: B



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11. The hybridisation of sulphur atom in SCl_4 and the shape of the molecule are

A. sp^3 and tetrahedral

B. sp^3d and distorted tetrahedral

C. sp^3d and trigonal bipyramidal

D. sp^3d and tetrahedral

Answer: B



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LIST - 1 LIST - 2

A) SF_6 1) angular

B) SF_4 2) open book

12. C) SF_2 3) octahedral

D) S_2F_2 4) pyramidal

5) distorted tetrahedral

The correct match is

A. A B C D
 1 2 3 4

B. A B C D
 4 2 5 3

C. A B C D
 2 4 1 5

D. A B C D
 3 5 1 2

Answer: D



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13. TeCl_4 is expected to be

- A. Tetrahedral
- B. Square planar
- C. Octahedral
- D. Trigonal bipyramid

Answer: D



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14. In SCl_4 the central atom involves

- A. sp^3 hybridization
- B. sp^2d^2 hybridization
- C. sp^2d^2 hybridization
- D. dsp^2 hybridization

Answer: A



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15. Which of the following is incorrectly matched?

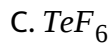
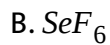
- A. SCI_4 - unstable liquid
- B. $SeCl_4$ - Sublimative solid
- C. $TeCl_4$ - hygroscopic solid
- D. SCI_2 - yellow oily liquid

Answer: D



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16. Which of the following can be prepared by the direct union of elements ?



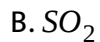
D. All

Answer: D



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17. Which of the following is least soluble in water?



Answer: C



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18. The wrong statement regarding sulphur oxides is

- A. SO_3 is formed in 2nd excited state of 'S'
 - B. Molecule of SO_3 contains both $P_{\pi} - P_{\pi}$ bonds and $P_{\pi} - d_{\pi}$ bonds
 - C. SO_2 and SO_3 can be differentiated by acidified $K_2Cr_2O_7$
 - D. $\gamma - SO_2$ is more stable than $\alpha - SO_3$
19. During the bleaching action of SO_2 it is converted to

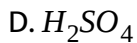
Answer: D



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19. During the bleaching action of SO_2 , it is converted to

- A. H_2SO_3
- B. SO_3

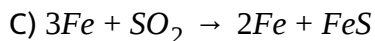
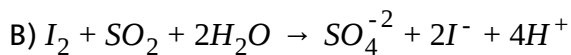
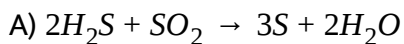


Answer: D



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20. Reducing property of SO_2 is shown in



A. A

B. B

C. A, B

D. A, C

Answer: B



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21. Bond angle, bond length and hybridisation in SO_3 molecule respectively are

A. 119.5° , 143 nm, sp^2

B. 119.5° , 143 pm, sp^2

C. 119.5° , 143 pm, sp^3

D. 119.5° , 143 pm, sp^3d

Answer: B

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22. Number of ' σ ' and ' π ' bonds in solid SO_3 cyclic structure are

A. 12σ and 6π

B. 12σ and 12π

C. 6σ and 12π

D. 6σ and 6π

Answer: A



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23. The oxide which acts as a reducing, oxidising, bleaching agent and a Lewis base is

A. SO_2

B. SO_3

C. CO_2

D. NO

Answer: A



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24. In γ -form of SO_3 , the hybridisation of sulphur is

A. sp

B. sp^3d

C. sp^2

D. sp^3

Answer: D



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25. X and Y are anhydrides of sulphurous and sulphuric acid respectively.

The hybridisation state and the shape of X and Y are

X

Y

- | | |
|---------------------|----------------------------|
| 1) sp^2 , angular | sp^2 , tetrahedral |
| 2) sp^2 , angular | sp^2 , angular |
| 3) sp^2 , angular | sp^2 , planar triangular |
| 4) sp^3 , planar | sp^3 , planar |



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26. An oxyacid of sulphur contained S = S linkage and the oxidation number of S in it is +6 and -2. It belongs to

- A. - ous series
- B. - ic series
- C. peroxy series
- D. thionic acid series

Answer: B



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27. The anhydride of pyrosulphuric acid is

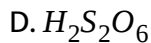
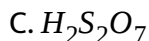
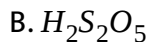
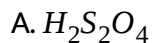
- A. SO_2
- B. $S_2O_3^{2-}$
- C. SO_3
- D. $S_2O_7^{2-}$

Answer: C



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28. Which of the following does not contain a symmetrical structure ?

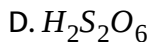
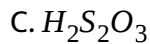
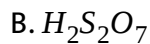
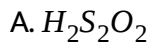


Answer: B



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29. In the following oxyacid of sulphur the two sulphur atoms exhibit the oxidation numbers of $+IV$ and $-II$



Answer: A



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30. H_2SO_4 reacts with sugar and acts as

A. A dehydrating agent

B. An oxidizing agent

C. A sulphonating agent

D. A salt forming agent

Answer: B



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31. The acid used in lead storage battery is

- A. Nitric acid
- B. Sulphuric acid
- C. Hydrochloric acid
- D. Phosphoric acid

Answer: A



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32. On heating ozone, its volume

- A. decrease to half
- B. becomes double
- C. increases to $\frac{3}{2}$ times

D. remain unchanged

Answer: C



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33. The compound that cannot be oxidised by ozone is

A. $KMnO_4$

B. PbS

C. KI

D. SO_2

Answer: A



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34. Regarding ozone the wrong statement is

- A. The bond angle is $116^{\circ}49'$
- B. O_3 acts as both oxidant and reductant
- C. O - O bond lengths are equal
- D. It is paramagnetic

Answer: D



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35. The correct order of O-O bond length in O_2 , H_2O_2 and O_3 is

- A. $H_2O_2 > O_3 > O_2$
- B. $O_3 > O_2 > H_2O_2$
- C. $O_2 > H_2O_2 > O_3$
- D. $H_2O_2 > O_2 > O_3$

Answer: A



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36. When O_3 is passed through an aqueous solution of KI, the pH of the resulting solution is

- A. 7
- B. 6.8
- C. 2.8
- D. 4.2

Answer: D



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37. Which is a mutual reduction reaction ?

- A) $KMnO_4 + O_3$
- B) $H_2O_2 + O_3$
- 3) $Ag_2O + O_3$
- D) $KI + H_2O + O_3$

A. A, B

B. A, C

C. A, D

D. B, C

Answer: D



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38. Which is not true for ozone ?

A. It oxidizes lead sulphate

B. It oxidizes potassium iodide

C. It oxidizes HCl .

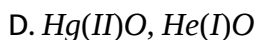
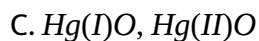
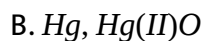
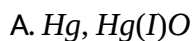
D. It can act as bleaching agent

Answer: A



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39. In the tailing of mercury ozone oxidises X to Y, X and Y are respectively



Answer: A



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40. Ozonised oxygen mixture when condensed which is first liquified.



C. Both are at same time

D. Both are never condensed

Answer: B



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41. Anhydride of pyrosulphuric acid is

A. SO_2

B. H_2S

C. SO_3

D. S_2O_3

Answer: C



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42. The advantage of manufacturing H_2SO_4 by Contact process than other methods is

- A) The acid obtained is highly pure and concentrated
- B) It is comparatively cheap method.
- C) The impurities can be tested and the reactants can be recycled.

A. A only

B. A and B

C. A and C

D. A, B and C

Answer: D



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43. In the reaction of hypo with I_2 to form $Na_2S_4O_6$ and NaI , the equivalent weight of hypo is (M is mol.wt. of hypo)

A. M

B. $M/2$

C. $M/4$

D. $M/6$

Answer: A



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44. In the reaction where hypo acts as antichlor, hypo undergoes

A. oxidation

B. reduction

C. disproportionation

D. halogenation

Answer: A



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45. What is the oxidation number of sulphur in $Na_2S_4O_6$?

A. +2

B. +2.5

C. 3.5

D. -2.5

Answer: B



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46. Example of neutral oxide is

A. CO_2

B. TeO

C. ZnO

D. *NO*

Answer: D



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47. Iodine oxidises $S_2O_3^{2-}$ ion to 'X', change in oxidation state of sulphur

A. +3

B. +2

C. +0.5

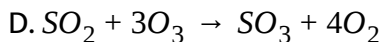
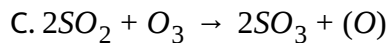
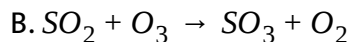
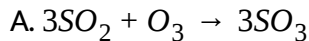
D. +4

Answer: C



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48. The chemical reaction between sulphur dioxide gas and gaseous ozone is best represented by the equations as



Answer: A



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49. Very dilute solution of sodium thiosulphate reacts with a solution of silver nitrate finally to give

A. White $\text{Ag}_2\text{S}_2\text{O}_3$ precipitate

B. Black $\text{Ag}_2\text{S}_2\text{O}_3$ precipitate

C. White Ag_2S precipitate

D. Black Ag_2S precipitate

Answer: D



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50. Sodium thiosulphate reacts with which of the following to convert into complex thiosulphates

A) ferric chloride

B) auric chloride

C) cupric chloride

The correct option is

A. B only

B. A and C

C. A and B

D. A, B and C

Answer: D



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51. Ordinary oxygen contains

- A. Only O^{16} isotope
- B. Only O^{17} isotope
- C. A mixture of O^{16} , O^{17} and O^{18} isotopes
- D. Only O^{18} isotope

Answer: C



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52. Oxygen gas can be prepared from solid $KMnO_4$ by

- A. Dissolving the solid in dil. HCl
- B. Dissolving the solid in dil. H_2SO_4
- C. Treating the solid with H_2 gas

D. Strongly heating the solid

Answer: D



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53. It is possible to obtain oxygen from air by fractional distillation because:

- A. Oxygen is in different group of periodic table from nitrogen
- B. Oxygen is more active than nitrogen
- C. Oxygen has higher boiling point than nitrogen
- D. Oxygen has lower density than nitrogen

Answer: C



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54. Oxygen molecule exhibits paramagnetism since it contains

- A. paired electrons
- B. unpaired electrons
- C. odd number of electrons
- D. two electrons in its valence shell

Answer: B



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55. Low volatile nature of H_2SO_4 is due to

- A. Hydrngen bonding
- B. Ionic nature
- C. Strong bonds
- D. Weak bonds

Answer: A



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56. Most abundand and most reactive element of group VIA elements

A. O, O

B. O, S

C. O, Po

D. S, O

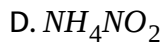
Answer: A



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57. Which compound on heating alone does not form O_2 ?

A. $KClO_4$

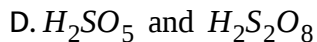
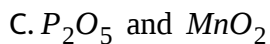
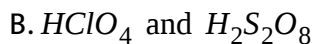
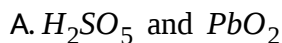


Answer: D



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58. The pair of compounds containing peroxy (O - O) group is

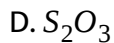
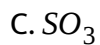
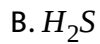
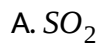


Answer: D



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59. Anhydride of pyrosulphuric acid is



Answer: C



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60. What is the oxidation number of sulphur in

A. +2

B. +2.5

C. 3.5

D. -2.5

Answer: B



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61. Which is not true for ozone ?

- A. It oxidizes lead sulphate
- B. It oxidizes potassium iodide
- C. It oxidizes HCl
- D. It can act as bleaching agent ?

Answer: A



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62. On heating ozone, its volume

- A. decrease to half

- B. becomes double
- C. increases to $\frac{3}{2}$ times
- D. remain unchanged

Answer: C



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63. The acid used in lead storage battery is

- A. Nitric acid
- B. Sulphuric acid
- C. Hydrochloric acid
- D. Phosphoric acid

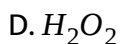
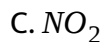
Answer: B



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64. When KBr is treated with conc. H_2SO_4 reddish-brown gas is evolved.

The gas is

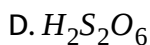
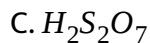
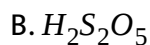
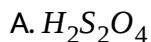


Answer: A



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65. Which of the following does not contain a symmetrical structure ?



Answer: B



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66. Oxygen molecule exhibits paramagnetism since it contains

- A. paired electrons
- B. unpaired electrons
- C. odd number of electrons
- D. two electrons in its valence shell

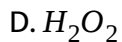
Answer: B



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67. Dry bleaching is done by using

- A. Cl_2



Answer: C



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EXAMPLE

1. Oxygen is a gas, but other elements of group 16 are solids at room temperature. Why?



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2. What is the percentage make up of most abundant element in the most abundant liquid of the earth's crust?



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3. First and second electron gain enthalpies of oxygen are -141 and $+702\text{kJmol}^{-1}$ How is large number of oxides accounted for ?

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4. Viscosity of sulphur increases when molten sulphur is heated from 120°C to 160°C . Why

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5. What are the oxidation numbers exhibited by oxygen?

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6. What is the maximum covalency of oxygen ? Give examples.

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7. Comment on the catenation capacity of sulphur.



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8. The dissociation constant of H_2O , H_2Se and H_2Te are 1.8×10^{-16} , 1.4×10^{-7} , 1.3×10^{-4} and 2.2×10^{-3} , respectively. What do these values denote ?



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9. Tellurium forms oxides of the formula TeO , TeO_2 and Te_3 . What is the nature of these oxides?



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10. Oxygen forms only fluorides, but other chalcogens form different halides. Why?



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11. Dry sulphurdioxide does not bleach dry flowers. Explain.



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12. A and B are elements with atomic numbers 16 and 17. Write different combinations of binary compounds known from them.



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13. Which oxyacid of sulphur has S - O - S link ? How is it prepared?



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14. Oxygen is divalent in its compounds, but sulphur is even hexavalent.

Why?



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15. Write the tautomerism in sulphurous acid.



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16. Justify that peroxymono and peroxydisulphuric acids have a peroxy linkage. How are they structurally different?



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17. Protocity of sulphuric acid is two. Explain?



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18. Write the structure and oxidation numbers of sulphur in tetrathionic acid.



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SUBJECTIVE EXERCISE-1 (LONG ANSWER QUESTIONS)

1. Discuss the general properties of VIA group elements.



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SUBJECTIVE EXERCISE-1 (SHORT ANSWER QUESTIONS)

1. Discuss the electronic configuration of group 16 elements.



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2. Write the trends in atomic radius, ionisation potential and metallic nature of group VIA elements.



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3. Write a short note on the allotropy of sulphur.



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4. Discuss the valency and bonding in oxygen and sulphur molecules



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5. Why oxidation states of sulphur are all even numbers ?



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SUBJECTIVE EXERCISE-1 (VERY SHORT ANSWER QUESTIONS)

1. What are the elements of VIA group ? Write their valency shell electronic configurations



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2. Why are group - 16 elements called chalcogens ?



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3. What are the molecular formulae of VI group elements ?



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4. Write the structure of gaseous sulphur molecule at low temperatures,



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5. Explain the different oxidation states of S in terms of its electronic configuration.



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6. What are the oxidation states of oxygen? Why does it not show higher oxidation states like +4 or +5?



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7. What is allotropy? Give the allotropes of oxygen.



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8. Write the names of the allotropic forms of sulphur.



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9. Compare the electron affinity of oxygen with sulphur.



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10. What is transition temperature ?



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SUBJECTIVE EXERCISE-2 (SHORT ANSWER QUESTION)

1. Write on the stability and acidic nature of hydrides of chalcogens.



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2. Water is a liquid and abnormally has low volatility. Explain.



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3. How are oxides of sulphur prepared ? What are their properties?



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4. Discuss the structures of sulphur dioxide and sulphur trioxide molecules.



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5. How are fluorides of oxygen prepared ? Write their structures.



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6. Mention the preparation and discuss the structures of S_2Cl_2 , SF_2 , SF_4 and SF_6 .



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7. What are the hydrides of chalcogens ? How do you prepare them in the laboratory?



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8. Why the bond angles in H_2O & H_2S are different ? Give reason.



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SUBJECTIVE EXERCISE-2 (VERY SHORT ANSWER QUESTION)

1. Write the names and formulae of the hydrides of oxygen.



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2. At room temperature H_2O is a liquid while H_2S is a gas. Explain.



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3. Write the order of thermal stability of the hydrides of group 16 elements.



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4. Explain the shape of water molecules.



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5. What is the shape of H_2S molecule? What kind of hybridization is undergone by S in it?



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6. What are the bond angles in H_2O and H_2S ? Why they differ in their bond angles even though the central atoms exhibit same hybridisations.



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7. What the shapes of SO_2 and SO_3 molecules ? Give the hybridizations in them.



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8. What are the products of hydrolysis of $SiCl_4$? Give the necessary equations.



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9. Which is more reactive SF_6 or TeF_6 ?



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10. What happens when tellurium tetrahalide is hydrolysed ?



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SUBJECTIVE EXERCISE-3 (SHORT ANSWER QUESTION)

1. Mention the four types of oxyacids of sulphur and give examples.



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2. Draw the structures of sulphite and sulphate.



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3. Write the peroxy acids and polythionic acids of sulphur.



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4. How is oxygen different from other elements of the same group ? What are the reasons ?



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SUBJECTIVE EXERCISE-3 (VERY SHORT ANSWER QUESTIONS)

1. Give any two oxo acids of S in its $+IV$ and $+VI$ states.



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2. Write the structural formulae of

(i) Sulphurous acid (H_2SO_3) and

(ii) Sulphuric acid (H_2SO_4)



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3. Write the structure of thio sulphuric acid and dithionic acid



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4. What are the oxidation states of sulphur atoms in peroxy sulphuric acids?



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OBJECTIVE EXERCISE-1

1. Which of the following set of atomic numbers belongs to group 16 elements ?

A. 56, 37, 20

B. 52, 8, 84

C. 16, 32, 50

D. 36, 9, 17

Answer: B



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2. Oxygen and Sulphur have same

A. outer electronic configuration

B. atomic size

C. electronic configuration

D. electron affinity

Answer: A



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3. Element with the lowest atomicity

A. Te

B. S

C. Se

D. O

Answer: D



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4. The number of atoms present in one molecule of rhombic sulphur is

A. 2

B. 4

C. 6

D. 8

Answer: D



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5. The total number of covalent bonds present in one S_8 molecule is

- A. 4
- B. 6
- C. 8
- D. 10

Answer: C



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6. The S - S - S bond angle in S_8 molecule is

- A. 109.5°
- B. 105°
- C. 120°

D. 60°

Answer: B



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7. The decreasing tendency to exist in puckered 8 - membered ring structure is

A. $S > Se > Te > Po$

B. $Se > S > Te > Po$

C. $S > Te > Se > Po$

D. $Tr > Se > S > Po$

Answer: A



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8. S_2 molecule in vapour state is paramagnetic due to the presence of unpaired electrons is

- A. Bonding σ orbitals
- B. Anti bonding σ^* orbital
- C. Anti bonding π^* orbitals
- D. Bonding π orbitals

Answer: C



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9. α , β and γ forms of sulphur differ in

- A. Overall packing of rings
- B. Molecular weight
- C. Atomicities
- D. Their ring structure

Answer: A



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10. The oxidation state of oxygen is zero in

A. CO

B. O_3

C. SO_2

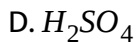
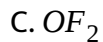
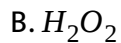
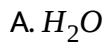
D. H_2O_2

Answer: B



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11. In which of the following compounds, oxygen exhibits +2 oxidation state ?



Answer: C



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12. Which of the following element does not show an oxidation state of +4 ?

A. oxygen

B. Sulphur

C. Selenium

D. Tellurium

Answer: A



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13. Generally oxygen is converted into its ion by

- A. Losing electrons
- B. Increasing oxidation number
- C. Decreasing atomic size
- D. Gaining electrons

Answer: D



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14. If X is a member of chalcogen family, the highest stability of X^{-2} is exhibited by

- A. Oxygen
- B. Selenium

C. Tellurium

D. Sulphure

Answer: A



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15. Oxidation state, covalency of sulphur and total number of lone pairs of electrons in S_8 molecule are respectively

A. +6, 6, 16

B. Zero, 2, 16

C. Zero, 6, 12

D. -2, 2, 16

Answer: B



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16. Which of the following resembles dioxygen in its magnetic property



Answer: D



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17. Oxygen is always divalent while sulphur can form 2, 4 and 6 bonds because

A. Oxygen is more electronegative than sulphur

B. Sulphur has vacant d-orbitals while oxygen does not

C. Sulphur has large atomic radius than oxygen

D. Sulphur is more electronegative than oxygen.

Answer: B



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18. In sulphate ion the oxidation state of sulphur is +6 and the hybridization state of sulphur is

A. sp

B. sp^2

C. sp^3

D. sp^3d^2

Answer: C



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19. The second most electronegative element in periodic table is

A. F

B. O

C. Cl

D. N

Answer: B



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20. Which of the following has higher IP ?

A. Oxygen

B. Sulphur

C. Selenium

D. Tellurium

Answer: A



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21. Element with higher catenation capacity is

- A. S
- B. Se
- C. Te
- D. Po

Answer: A



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22. The order of electron gain enthalpy of VI A group elements is

- A. $S > Se > Te > Po > O$
- B. $S > Se > Te > O > Po$
- C. $O > Se > S > Te > Po$

D. $O > Te > Se > S > Po$

Answer: A



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23. The most common oxidation state of VI A group elements is

A. -2

B. +2

C. +4

D. +6

Answer: A



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24. What is the role of MnO_2 in the preparation of O_2 from $KClO_3$?

- A. Activator
- B. Catalyst
- C. Oxidizing agent
- D. Dehydrating agent

Answer: B



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25. In photosynthesis , oxygen is liberated due to

- A. P
- B. Na
- C. F_2
- D. I_2

Answer: C



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26. Chair form of S_6 rings are present in

- A. α - sulphur
- B. β - sulphur
- C. Engle's sulphur
- D. γ - sulphur

Answer: C



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27. The pair of exothermic hydrides of VI A group are

- A. H_2O, H_2S
- B. H_2S, H_2Se
- C. H_2Se, H_2Te

D. H_2O, H_2Te

Answer: A



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28. The K_a values of H_2Se and H_2Te are respectively

A. $1.3 \times 10^{-4}, 2.3 \times 10^{-3}$

B. $2 \times 10^{-3}, 2.3 \times 10^{-3}$

C. $2 \times 10^{-14}, 2.3 \times 10^{-4}$

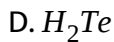
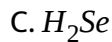
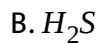
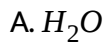
D. $2.3 \times 10^{-3}, 2 \times 10^{-4}$

Answer: A



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29. Which is non poisonous hydride ?



Answer: A



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30. Sulphur uses orbitals for bonding in H_2S



C. one s and one p

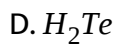
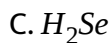
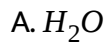
D. pure p orbitals

Answer: D



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31. A stronger reducing agent is

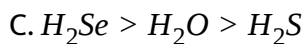
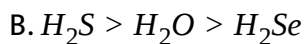
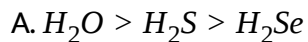


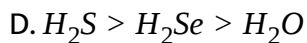
Answer: D



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32. Correct decreasing order of volatility is



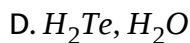
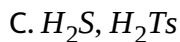
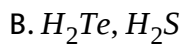
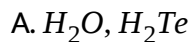


Answer: D



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33. The most acidic and thermally stable hydride of chalcogens are respectively

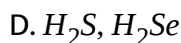
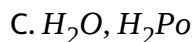
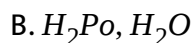
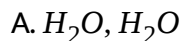


Answer: D



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34. In the hydrides of VIA elements largest bond angle and bond length is observed respectively in



Answer: C



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35. The effect of repulsion between the two lone pairs of electrons present on oxygen in H_2O molecule is

A. no change in $H - O - H$ bond angle

B. increase in $H - O - H$ bond angle

C. decrease in $H - O - H$ bond angle

D. all atoms will be in one plane

Answer: C



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36. Which of the following is a weakest acid in its aqueous solution ?

A. H_2Te

B. H_2Se

C. H_2S

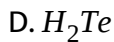
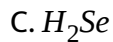
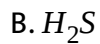
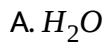
D. H_2Po

Answer: C



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37. Which of the following is least covalent hydride?

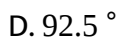
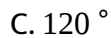
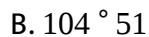
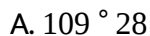


Answer: A



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38. The bond angle in H_2S is

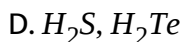
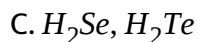
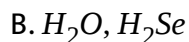
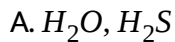


Answer: D



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39. The pair of exothermic hydrides of VI A group are

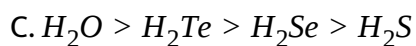
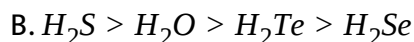
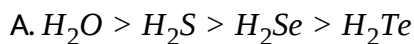


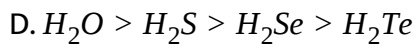
Answer: A



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40. The correct order of boiling points of the given hydrides of 16th group elements is





Answer: C



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41. The least stable dioxide of group 16 elements is



Answer: D



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42. The oxide obtained in the roasting of ironpyrites

A. SO_2

B. SO_3

C. FeO

D. SO_2 and SO_3

Answer: A



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43. Among hexahalides of VIA group, the stable halides are

A. hexa iodides

B. hexa bromides

C. hexa chlorides

D. hexa fluorides

Answer: D



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44. SO_2 bleaches by

- A. Reduction
- B. Oxidation
- C. Hydrolysis
- D. Acidic nature

Answer: A



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45. The element of VI A group which cannot form hexahalides is

- A. O
- B. S
- C. Se

D. Te

Answer: A



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46. The hybridization of $\text{Si in } \text{SF}_4$ is

A. sp^3d^2

B. sp^3d

C. sp^3d^3

D. sp^3

Answer: B



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47. SO_2 forms an addition compound sulphuryl chloride with Cl_2 in presence of

A. Charcoal

B. CCl_4

C. $\text{H}^+ / \text{K}_2\text{Cr}_{20}_7$

D. $\text{H}^+ / \text{KMO}_4$

Answer: A



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48. Which of the following can undergo disproportionation ?

A. Se_2Cl_2

B. SF_6

C. TeF_4

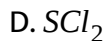
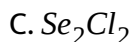
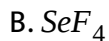
D. SeCl_4

Answer: A



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49. Which of the following has see saw geometry



Answer: B



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50. Which of the following is not true about SO_2



B. Liquid SO_2 is a non aqueous solvent

C. It is a inear molecule

D. It can act like a preservative

Answer: C



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51. Most acidic oxide in group VI is formed by

A. oxygen

B. sulphur

C. nitrogen

D. chlorine

Answer: B



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52. The hybridization of sulphur in SO_2 is:

A. sp

B. sp^3

C. sp^2

D. dsp^2

Answer: C



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53. In SO_2 two oxygen atoms are linked to the sulphur atom through double bonds. The two π bonds are

A. both $p_\pi - p_\pi$

B. both $p_\pi - d_\pi$

C. both $d_\pi - d_\pi$

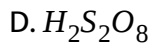
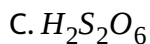
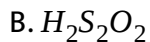
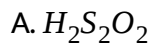
D. one $d_\pi - p_\pi$ one $p_\pi - p_\pi$

Answer: D



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54. Peroxy linkage is present in

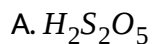


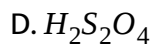
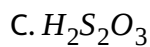
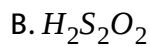
Answer: D



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55. Pyrosulphurous acid is





Answer: A



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56. Basicity of any oxyacid of sulphur is

A. 3

B. 4

C. 2

D. 1

Answer: C



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57. Partial neutralisation of sulphuric acid gives

- A. Sulphites
- B. Bisulphates
- C. Sulphates
- D. Bisulphites

Answer: B



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58. Hybridisation of central sulphur in all oxo anions of sulphur is

- A. sp^3d
- B. sp^3
- C. sp^3d^2
- D. sp^2d

Answer: B



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59. What is the number of sigma and pi bonds present in H_2SO_4 molecule ?

A. 6σ and 2π

B. 6σ and 0π

C. 2σ and 4π

D. 2σ and 2π

Answer: A



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60. Permonosulphuric acid is known as

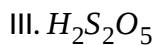
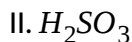
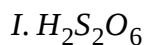
- A. Marshall's acid
- B. Caro's acid
- C. Sulphuric acid
- D. fSulphurous acid

Answer: B



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61. Identify the correct sequence of increasing number of π - bonds in the structures of the following molecules.



A. I,II,III

B. II,III,I

C. II,I,III

D. I,III,II

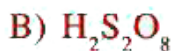
Answer: B



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62. Match the following

List – I



List – II

1) Dithionic acid

2) Caro's acid

3) Oleum

4) Marshall's acid

5) Polythionic acid

A. A - 4, B - 2, C - 3, D - 5

B. A - 3, B - 2, C - 1, D - 5

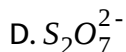
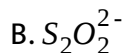
C. A - 2, B - 4, C - 5, D - 1

D. A - 2, B - 4, C - 3, D - 1

Answer: D

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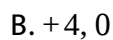
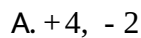
63. The anhydride of pyrosulphuric acid is



Answer: C

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64. In $\text{HO} - \overset{\text{O}}{\underset{\text{||}}{\text{S}}} - \text{OH}$ the oxidation states of S are



C. +2, - 2

D. +4, - 4

Answer: A



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65. Acid that contains S - O - S linkage is

A. $H_2S_2O_7$

B. $H_2S_2O_5$

C. $H_2S_2O_6$

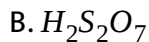
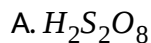
D. $H_2S_2O_4$

Answer: A

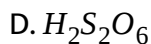


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66. Which of the following has S-S bond



C. Mustard gas



Answer: D



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67. The formation of O_3 from O_2 is

A. exothermic and reversible

B. endothermic and irreversible

C. endothermic and reversible

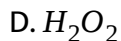
D. exothermic and spontaneous

Answer: C



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68. Dry bleaching agent is



Answer: A



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69. A black compound 'X' when treated with O_3 turned white. The compound 'X' is

A. ZnS

B. PbS

C. CuS

D. Ag_2S

Answer: B



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70. The O - O bond length in Ozone is

A. 1.33\AA

B. 1.28\AA

C. 1.48\AA

D. 1.39\AA

Answer: B



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71. With respect to both oxygen and ozone, which one of the following statements is not correct?

- A. They are allotropes together
- B. oxygen is colourless while ozone is coloured
- C. valency of oxygen is 2 in both
- D. oxygen has 2 bonds and ozone has 3 bonds

Answer: C



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72. In the tailing of mercury ozone oxidises X to Y, X and Y are respectively

- A. Hg , $Hg(I)O$
- B. Hg , $Hg(II)O$

C. $Hg(I)O$, $Hg(II)O$

D. $Hg(II)O$, $Hg(I)O$

Answer: A



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73. Which is a mutual reduction reaction ?

A) $KMnO_4 + O_3$

B) $H_2O_2 + O_3$

3) $Ag_2O + O_3$

D) $KI + H_2O + O_3$

A. A,B

B. A,C

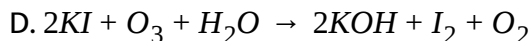
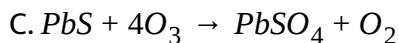
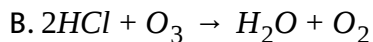
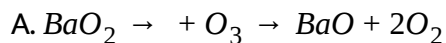
C. A,D

D. B,C

Answer: D

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74. In which of the following reactions ozone acts as a reducing agent?



Answer: A

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75. Which gas is used to improve the atmosphere of crowded places ?



D. N_2O

Answer: C



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76. O_3 is prepared by subjecting O_2 to silent electric discharge. The favourable conditions for the formation of ozone according to Le-Chatelier's principle are

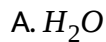
- A. low temperature, low pressure
- B. high temperature, high pressure
- C. low pressure, high pressure
- D. high temperature, low pressure

Answer: B



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77. Mercury sticks to glass when it comes in contact with



Answer: D



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78. Decomposition of Ozone into Oxygen has

A. $\Delta G = -ve$

B. $\Delta S = -ve$

C. $\Delta H = +ve$

D. All of these

Answer: A



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79. Which of the following statements is not correct ?

- A. Ozone is not a green house gas
- B. Ozone can oxidise NO to NO_2
- C. Ozone is a bent molecule
- D. Ozone filters the ultraviolet light in upper stratosphere

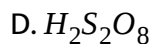
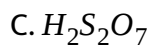
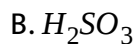
Answer: A



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80. Oil of vitriol is

- A. H_2SO_4

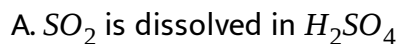


Answer: A



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81. In the preparation of H_2SO_4



Answer: C



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82. Poison for platinum, a catalyst in Contact process is

- A. S
- B. P
- C. As
- D. C

Answer: C



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83. In Contact process impurities of arsenic are removed by:

- A. $Al(OH)_3$
- B. $Fe(OH)_3$
- C. $Cr(OH)_3$
- D. Fe_2O_3

Answer: B



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84. The gas liberated when aluminium reacts with conc. H_2SO_4 is

A. Protein

B. Fat

C. Hydrocarbon

D. Carbohydrate

Answer: D



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85. Oleum or fuming H_2SO_4 is

A. A mixture of conc. H_2SO_4 and oil

- B. Sulphuric acid which gives fumes of sulphur dioxide
- C. Sulphuric acid saturated with sulphur trioxide, i.e., $H_2S_2O_7$
- D. A mixture of sulphuric acid and nitric acid

Answer: C



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86. Practical pressure utilised in contact tower

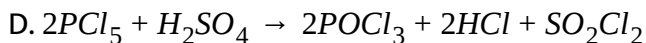
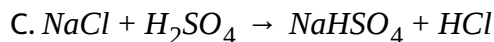
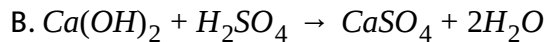
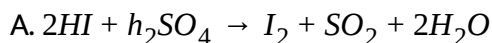
- A. 2 bar
- B. 0.2 bar
- C. 20 bar
- D. 200 bar

Answer: A



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87. Which reaction represents the oxidizing behaviour of H_2SO_4 ?



Answer: A



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88. Hypo is a salt of the oxyacid

A. thiosulphuric acid

B. thiosulphurous acid

C. dithionous acid

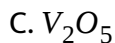
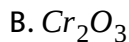
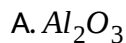
D. dithionic acid

Answer: A



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89. The catalyst uned in the manufacture of H_2SO_4 by contact process is



Answer: C



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OBJECTIVE EXERCISE-2

1. The most abundant VA group element in the earth's crust is

A. O

B. Se

C. S

D. Te

Answer: A



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2. Oxygen exhibits least oxidation state in

A. OF_2

B. KO_2

C. H_2O

D. H_2O_2

Answer: C



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LIST - 1

- A) Gypsum
- B) Baryts
- C) Galena
- D) Zinc blende

LIST - 2

- 1) PbS
- 2) ZnS
- 3) BaSO_4
- 4) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
- 5) Fe_3O_4

3.

The correct match is

A.

A	B	C	D
4	5	1	3

B.

A	B	C	D
2	5	1	2

C.

A	B	C	D
4	3	1	2

D.

A	B	C	D
3	4	1	2

Answer: C



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4. Polyanion formation is maximum in

A. Nitrogen

B. Oxygen

C. Sulphur

D. Boron

Answer: C



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5. In a compound of sulphur, the sulphur atom is in second excited state.

The possible hybridisation of sulphur is

A. sp^2

B. sp^3

C. $sp^3(d)$ (or) sp^3d^2

D. sp^2 (or) sp^3 (or) sp^3d^2

Answer: D



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6. Which of the following has strong metallic interactions ?

A. Oxygen

B. Sulphur

C. Selenium

D. Tellurium

Answer: D



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7. The chalcogen having same number of electrons both in penultimate and antipenultimate shells is

A. O

B. S

C. Se

D. Te

Answer: D



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8. The number of paired and unpaired electrons in the valence shell of the members of oxygen family are

A. 4 and 2

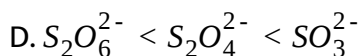
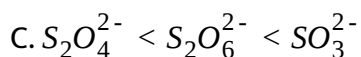
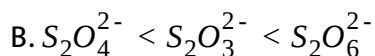
B. 2 and 4

C. 3 and 4

D. 2 and 3

Answer: A

9. The oxidation state of sulphur in the anions follow the order



Answer: A

10. In which allotropic form of sulphur, puckered S_8 rings are not present ?

A. Chair form of sulphur

B. Rhombic sulphur

C. Monoclinic sulphur

D. γ - monoclinic sulphur

Answer: A



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11. Oxygen molecules is

A. Diamagnetic with no unpaired electrons

B. Diamagnetic with two unpaired electrons

C. Paramagnetic with two unpaired electrons

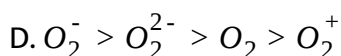
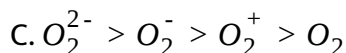
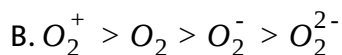
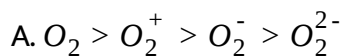
D. Paramagnetic with no unpaired electrons

Answer: C



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12. In the species O_2 , O_2^- and O_2^{2-} , the correct decreasing order of bond strength is given as

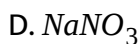
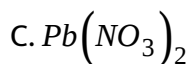
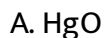


Answer: B



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13. All of the following decompose easily on heating to give O_2 except

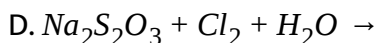
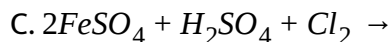
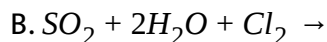
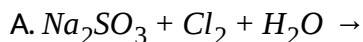


Answer: B



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14. In which one of the following reactions, 16 group element is precipitated



Answer: D



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15. The number of lone pairs and S-S bonds, in S_8 molecule, respectively

A. 8×8

B. 4×4

C. 16×8

D. 16×4

Answer: C



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16. When PbO_2 reacts with conc. HNO_3 , the gas evolved is

A. NO_2

B. O_2

C. N_2

D. N_2O

Answer: B



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17. The geometry of H_2S and its dipole moment are

- A. Angular and non zero
- B. Angular and zero
- C. Linear and non zero
- D. Linear and zero

Answer: A



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18. Regarding H_2O_2 the wrong statement is

- A. H_2O in an exothermic compound
- B. It is an associated liquid
- C. Central atom is sp^3 hybridised

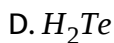
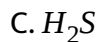
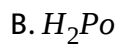
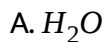
D. It is an excellent solvent for covalent compounds

Answer: D



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19. In which of the following bond angle can not be explained by Valence Bond Theory?

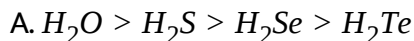


Answer: A

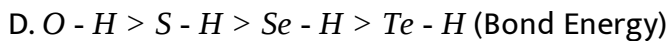
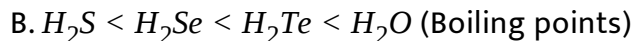


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20. Which of the following order is wrong ?



(Thermal stability)

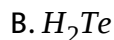
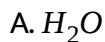


Answer: C



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21. The hydride of group 16 elements which shows greater Lewis base character



D. H_2Se

Answer: A



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22. Amongst H_2O , H_2S , H_2Se and H_2Te , the one with the highest boiling point is

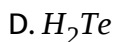
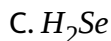
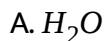
- A. H_2O because of hydrogen bonding
- B. H_2Te because of higher molecular weight
- C. H_2S because of hydrogen bonding
- D. H_2Se because of lower molecular weight

Answer: A



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23. Which of the following hydrides shows the highest boiling point ?

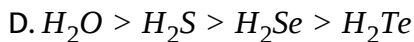
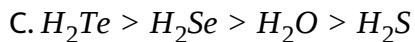
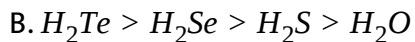
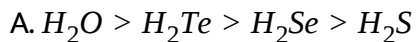


Answer: A



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24. The correct order of boiling points of the given hydrides of 16th group elements is



Answer: A



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25. Among the following the weakest conjugate base is

A. OH^-

B. SH^-

C. SeH^-

D. TeH^-

Answer: D



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26. The shape of sulphur hexafluoride molecule is

A. Tetrahedral

B. Square planar

C. Pyramidal

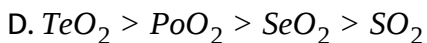
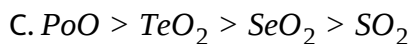
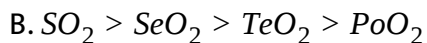
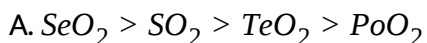
D. Octahedral

Answer: D



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27. The acidic character of dioxides of members of oxygen family decreases in the order



Answer: B



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28. The statements about oxides of chalcogens

- i) The solubility of dioxides decreases from SO_2 to PoO_2
- ii) TeO_2 is highly acidic in nature
- (iii) Trioxides are more acidic than dioxides

The correct combination is

- A. i&iii are correct
- B. all are correct
- C. only iii is correct
- D. i&ii are correct

Answer: A



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29. Regarding SF_6 , the wrong statement is

- A. It is a inert and does not undergo hydrolysis
- B. It is a covalent compoind
- C. Hybridisation of S is sp^3d^2 and shape is octahedral
- D. S forms SF_6 in third excited state

Answer: D



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30. Sulphur shows maximum coordination number is SX_n . Where 'X' is

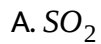
- A. F
- B. Br
- C. I
- D. Cl

Answer: A



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31. The molecule having one $p\pi - p\pi$ and two $p\pi - d\pi$ bonds is

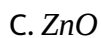
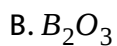
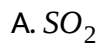


Answer: B



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32. Which is an amphoteric oxide ?



D. Na_2O

Answer: C



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33. One gas bleaches the colour of the flowers by reduction while the other by oxidation in the presence of moisture. The gases are

A. CO and CO_2

B. H_2S and Br_2

C. SO_2 and Cl_2

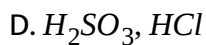
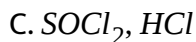
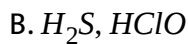
D. NH_3 and SO_3

Answer: C



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34. SCl_4 on hydrolysis gives

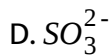


Answer: D



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35. Sulphurous anhydride is

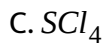
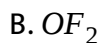


Answer: A



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36. Which of the following dissolves in water but does not give any oxyacid solution?



Answer: B



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37. In OF_2 molecule, the total number of bond pairs and lone pairs of electrons present respectively are

A. 2, 6

B. 2, 8

C. 2, 10

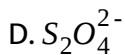
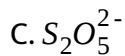
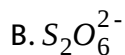
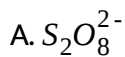
D. 2, 9

Answer: B



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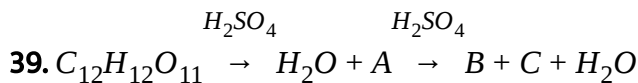
38. Which of the following ions does not have S-S linkage ?



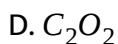
Answer: A



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If the compound C is an oxide of group VIA element then the compound B is



Answer: C



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40. When moist coloured flowers are added into SO_2 gas the flowers are decolourised because



- B. SO_2 oxidised vegetable colouring matter
- C. SO_2 reduces vegetable colouring matter
- D. SO_2 gives colourless product

Answer: C



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41. Which of the following can give an oxyacid when dissolved in H_2O ?

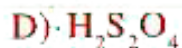
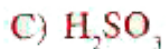
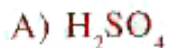
- A. Cl_2O
- B. SO_3
- C. SO_2
- D. All

Answer: D



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LIST - 1



LIST-2 (OS of 'S')

1) + 4

2) + 3

3) + 2, -2

4) + 6

5) + 5, 0

42.

The correct match of the above lists is

A. A B C D

2 5 2 4

B. A B C D

3 2 1 4

C. A B C D

4 5 1 2

D. A B C D

2 3 1 5

Answer: C



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43. A salt of sulphurous acid is called

- A. Sulphate
- B. Sulphurate
- C. Sulphite
- D. Sulphide

Answer: C



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44. Which of the following species is basic and reducing ?

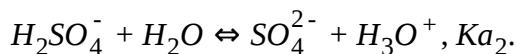
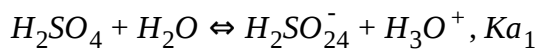
- A. SO_3^{2-}
- B. SO_4^{2-}
- C. $\text{S}_2\text{O}_4^{2-}$
- D. HSO_4^-

Answer: A



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45. In aqueous solutions H_2SO_4 ionises as:



The relation between K_{a1} and K_{a2} is

A. $K_{a1} < K_{a2}$

B. $K_{a1} > K_{a2}$

C. $K_{a1} = K_{a2}$

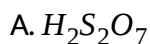
D. $2K_{a1} = 3K_{a2}$

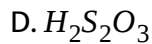
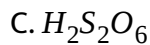
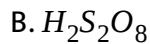
Answer: B



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46. Single bond between sulphure atoms is present in





Answer: C



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47. Number of hydroxyl groups present in pyrosulphuric acid is

A. 3

B. 4

C. 2

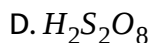
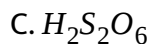
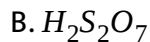
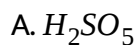
D. 1

Answer: C



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48. The acid containing S - O - O - S bond is



Answer: D



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49. S-S bond is not present in

A. Pyro sulphurous acid

B. Dithionic acid

C. Dithionous acid

D. Pyro sulphuric acid

Answer: D



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50. Oxidation state of S in H_2SO_5 and $H_2S_2O_8$ respectively are

A. +6, +6

B. +6, +4

C. +8, 7

D. +4, +4

Answer: A



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51. The ratio of $p\pi - d\pi$ bond in SO_2 and SO_3 molecules

A. 1:1

B. 1:2

C. 2:1

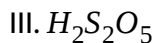
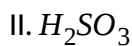
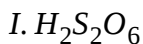
D. 2:3

Answer: B



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52. Identify the correct sequence of increasing number of π - bonds in the structures of the following molecules.



A. I, II, III

B. II, III, I

C. II, I, III

D. I, III, II

Answer: B



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53. The number of sigma and pi bonds in peroxodisulphuric acid are, respectively.

A. 9 and 4

B. 11 and 4

C. 4 and 8

D. 4 and 9

Answer: B



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54. Iron sulphide is heated in air to form A, an oxide of sulphur. A is dissolved in water to give an acid. The basicity of this acid is

A. 2

B. 3

C. 1

D. zero

Answer: A



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55. Which of the following has S-O-S bond in it is

A. Pyrosulphurous acid

B. Oleum

C. Caro's acid

D. Marshal's acid

Answer: B



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56. Which statement is correct ?

- A. Ozone is a resonance hybride of oxygen
- B. Ozone is an allotropic modification of oxygen
- C. Ozone is an isomer of oxygen
- D. Ozone has no relationship with oxygen

Answer: B



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57. The incorrect statement among the following is

- A. Ozone is an angular molecule
- B. O_3 is a poisonus gas
- C. O_3 is highly soluble in water

D. Ozone is present in stratosphere

Answer: C



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58. Ozonization of water is carried out to remove

A. Bacterial impurities

B. Bad taste

C. Excess of chlorine present

D. Calcium and magnesium salt present in it

Answer: A



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59. Which of the following conversion is not brought about by ozone ?

A. HF to F_2

B. Moist KI to I_2

C. Ag_2O to Ag

D. PbS to $PbSO_4$

Answer: A



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60. Number of volumes of Oxygen that gives 4 volumes of Ozone is

A. 4

B. 6

C. 8

D. 2

Answer: B



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61. Starch paper moistened with KI solution turns blue in ozone because of

- A. Iodine liberation
- B. Oxygen liberation
- C. Alkali formation
- D. Ozone is acidic

Answer: A



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62. Pure ozone is

- A. Pale blue gas
- B. Dark blue liquid
- C. Violet black solid

D. All the above

Answer: D



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63. Ethylene on reaction with ozone gives

A. Glyoxal

B. Formaldehyde

C. Ethylene ozonide

D. Acetaldehyde

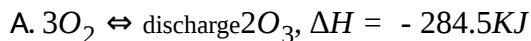
Answer: C



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64. Which of the following is not correct ?

Silent electric



B. Ozone undergoes addition reaction with unsaturated carbon compounds.

C. Nitrogen oxides emitted from jet planes might be slowly depleting ozone.

D. Ozone oxidises lead sulphide to lead sulphate

Answer: A



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65. Select the wrong statement

A. Ozone is a pale blue gas

B. O_3 acts as both oxidant and reductant

C. Ozone is used as an antiseptic inhaler

D. Ozone is used in sterilization of water

Answer: C



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66. Ozone oxidises iodide to

- A. iodine
- B. hypoiodite
- C. iodate
- D. periodate

Answer: A



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67. Which of the following substances do not react with ozone ?

- A. PbS

B. Starch iodide

C. $KMnO_4$

D. Bleaching powder

Answer: C



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68. Which of the following will not react with O_3 ?

A. $KMnO_4$

B. KI

C. $FeSO_4$

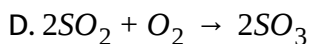
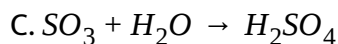
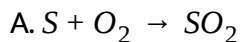
D. K_2MnO_4

Answer: A



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69. In the preparation of H_2SO_4 , by Contact process V_2O_5 is used as a catalyst in the reaction.



Answer: D



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70. H_2SO_4 has very corrosive action on skin because

A. It reacts with proteins

B. It acts as an oxidizing agent

C. It acts as dehydrating agent

D. It acts a dehydrating agent and absorption of water is highly exothermic

Answer: D



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71. Concentratged H_2SO_4 is not used to prepare HBr from KBr becaue it

- A. Oxidizes HBr
- B. Reduces HBr
- C. Caused disporportionation of HBr
- D. Reacts too slowly with KBr

Answer: A



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72. Which of the following statements regarding the manufacture of H_2SO_4 by Contact process is not true ?

- A. Sulphur is burnt in air to form SO_2
- B. SO_2 is catalytically oxidised to SO_3
- C. SO_3 is dissolved in water to get 100 % sulphuric acid
- D. H_2SO_4 obtained by contact process is of higher purity than that obtained by other processes

Answer: C



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73. Sulphuric acid is used

- A) In petroleum refining
- B) In galvanising
- C) In making fertilizers

A. A,B

B. B,C

C. A,C

D. A,B,C

Answer: D



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74. The element which evolves two gases on reacting with conc. H_2SO_4 is

A. Si

B. C

C. S

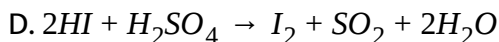
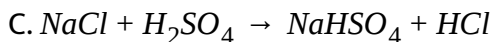
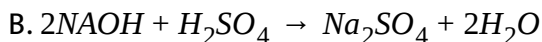
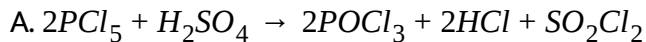
D. P

Answer: B



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75. Which reaction represents the oxidizing behaviour of H_2SO_4 ?



Answer: D



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76. Which characteristic property of H_2SO_4 is responsible for its chemical properties

A. low volatility

B. weak acidic nature

C. acting as reductant

D. affinity for water

Answer: D



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77. Pick out the ideal condition for H_2SO_4 manufactured by contact process

- A. Low temperature, high pressure and high concentration of reactants
- B. Low temperature, low pressure and low concentration of reactants
- C. High temperature, high pressure and high concentration of reactants
- D. Low temperature, low pressure and high concentration of reactants

Answer: A



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78. Hydrolysis of one mole of peroxodi-sulphuric acid produces :

- A. two moles of sulphuric acid
- B. two moles of peroxomono-sulphuric acid
- C. one mole of sulphuric acid, one mole of peroxomono-sulphuric acid
- D. one mole of sulphuric acid, one mole of peroxomono-sulphuric acid
and one mole of hydrogen peroxide

Answer: C



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79. HCOOH reacts with conc. H_2SO_4 to produce

- A. CO
- B. CO_2
- C. NO
- D. NO_2

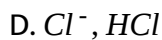
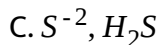
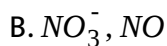
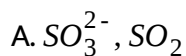
Answer: A



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80. Consider the following reactions

$X_{(aq)} + H_2SO_{4(dil)} \rightarrow Y$, colourless gas with pungent smell



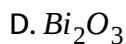
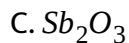
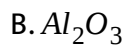
Answer: A



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OBJECTIVE EXERCISE-3 (Previous NEET/AIPMT Questions)

1. Which of the following is the most basic oxide?



Answer: D



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2. The angular shape of ozone molecule (O_3)

consists of

A. 1σ and 1π bond

B. 2σ and 1π bond

C. $1\sigma 2\pi$ binds

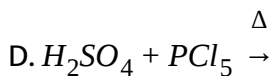
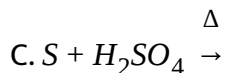
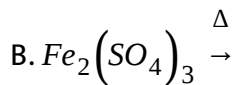
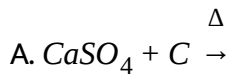
D. 2σ and 2π bonds

Answer: B



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3. Sulphur trioxide can be obtained by which of the following reaction ?

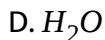
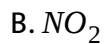


Answer: B



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4. Which one of the following molecules contains no π bond ?

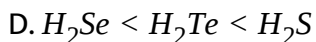
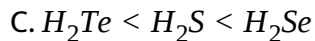
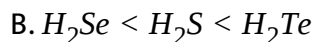
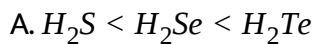


Answer: D



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5. Acidity of diprotic acids in aqueous solutions increases in the order

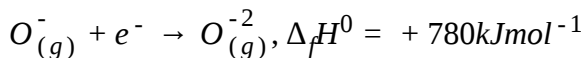
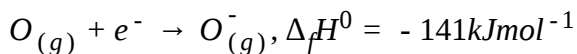


Answer: A



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6. The formation of the oxide ion $O_{(g)}^{2-}$ from oxygen atom requires first an exothermic and then an endothermic step as shown below :



Thus, process of formation of O^{2-} in gas phase is unfavourable even though O^{2-} is isoelectronic with neon. It is due to the fact that (2015)

- A. O^{-} ion has comparatively smaller size than oxygen atom
- B. Oxygen is more electronegative
- C. Addition of electron in oxygen result in larger size of the ion
- D. Electron repulsion outweighs the stability gained by achieving noble gas configuration.

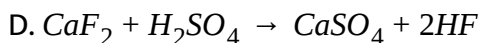
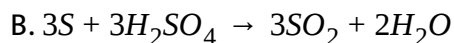
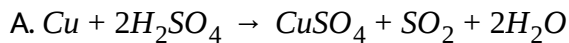
Answer: D



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7. Hot concentrated sulphuric acid is a moderately strong oxidizing agent.

Which of the following reactions does not show oxidizing behaviour ?

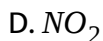
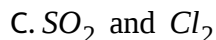
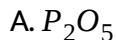


Answer: D



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8. Name the gas that can readily decolourise acidified KMnO_4 solution.

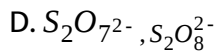
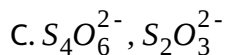
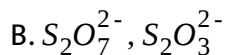
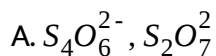


Answer: C



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9. In which pair of ions both the species contains S-S bond ?



Answer: C



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OBJECTIVE EXERCISE-4 (Assertion (A) & Reason (R) Type Question)

1. (A) Thermal stability of the hydrides of VIA group elements decreases from H_2O to H_2Po

(R) The heats of dissociation of M-H bond of hydrides of VIA group decreases down the group

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



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2. (A): H_2O is thermally more stable than H_2S

(R): H_2O molecules can form inter-molecular hydrogen bonds where as H_2S molecules can not.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: B



Watch Video Solution

3. (A): Direct absorption of SO_3 in H_2O is commercially not possible

(R): Direct absorption of SO_3 in water forms a mist of corrosive vapours.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

4. (A) The formation of SO_3 by contact process is an example of heterogeneous catalysis

(R): The reactants and product are in different phase in the formation of SO_3 by contact process

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



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5. (A): Oxygen has highest tendency, among chalcogens, to form dinegative ion

(R): Electron affinity of oxygen is highest among chalcogens

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



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6. (A) Diatomic sulphur has a dicovalent bond

(R) General valency of sulphur is two

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: B



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7. (A): Water forms hydronium ion in acid solutions

(R): The maximum covalency of oxygen is three

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

8. (A): Sulphur is hexavalent in the ground state

(R): Sulphur can form a minimum of six bonds

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of
(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

9. (A): Oxygen exhibits positive oxidation states in some of its compounds

(R): In binary fluorides, fluorine is always more electronegative

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of

(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

10. (A): Ozone is an allotrope of oxygen.

(R): Ozone is better oxidising agent as compared with oxygen.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: B



Watch Video Solution

11. (A): Catanation ability of sulphur is observed in polysulphides

(R): A polysulphide with eight sulphur atoms is known

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: C



Watch Video Solution

12. (A): Water is the most stable hydride of chalcogens

(R): Among M-H bonds of chalcogen hydrides, O - H bond is more stable.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of

(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

13. (A): Ozone can be used qualitatively to distinguish unsaturated hydrocarbons from saturated

(R): Ozonides are formed with unsaturated hydrocarbons

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

14. (A) Formic acid is made poisonous with the presence of sulphuric acid

(R) Sulphuric acid acts as dehydrating agent liberating carbon monoxide from formic acid

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: A



Watch Video Solution

15. (A): Conc. H_2SO_4 reacts with KCl to give Cl_2 gas

(R): HCl cannot be oxidised by conc. H_2SO_4

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

16. (A): SO_3 molecule has a planar structure

(R) : S atom in SO_3 is sp^2 - hybridized and O - S - O bond angle is 120°

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of
(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

17. (A) Tendency of forming multiple bond is highest for oxygen among chalcogens

(R) Size of oxygen is smallest among chalcogens

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

18. (A) Oxygen is most abundant in earth's atmosphere

(R) Oxygen is the stablest gas present in the air

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: D



Watch Video Solution

19. (A) White suspension of lead (II) sulphate turns blackish on passing ozone though it.

(R) Ozone oxidises SO_4^{2-} to $S_2O_8^{2-}$ ion.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: D



Watch Video Solution

20. (A) There is no sulphur sulphur bond in thiosulphate

(R) All sulphur sulphur bonded compounds are persulphates

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of

(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



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21. (A) Oxygen belongs to group 16 of the long form of the periodic table

(R) Oxygen has relative atomic mass 16U

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of

(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

22. (A) When conc. H_2SO_4 comes into contact with cane sugar, the later becomes black.

(R) Conc. H_2SO_4 dehydrate sugar to black residue carbon

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: A



Watch Video Solution

23. (A) When SO_2 is passed into dichromate solution, green colour is observed

(R) SO_2 acts as oxidant as well as reductant

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: B



Watch Video Solution

24. (A) O_2^- ion is more stable than O_2^+ ion

(R) Negative ions are always more stable than positive ions

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of

(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

25. (A) Conc. H_2SO_4 is an example of viscous liquid

(R) Hydrogen bonding is present between molecules of sulphuric acid

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

26. (A) Caro's acid has S atom in + 6 oxidation state

(R) Caro's acid contains the peroxo O_2^{2-} group

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: A



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27. (A) OF_2 is named as oxygen difluoride

(R) In OF_2 , oxygen is less electronegative than fluorine

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: A



Watch Video Solution

28. (A) Both SO_2 and SO_3 are reducing agents

(R) Both SO_2 and SO_3 bleach the articles by reduction

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of

(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



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29. (A) Among chalcogens, tendency of catenation is maximum for sulphur

S-S bond dissociation energy is less than O-O bond dissociation energy.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: C



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30. (A) In SO_2 , the bond angle is 119° whereas in SO_3 , the bond angle is 120° .

(R) S atom in both SO_2 and SO_3 is sp^2 - hybridized.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: B



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31. (A) : H_2SO_4 is called king of chemicals

(R) : H_2SO_4 has wide range of applications in industries.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

32. (A) Oxygen does not exhibit oxidation number more than +2 in its compounds.

(R) Oxygen is the highest electronegative element in 16th group.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

33. (A) Oxygen is least electron affinity element in 16th group

(R) Oxygen does not contain vacant dorbitals.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of
(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

34. (A) Thermal stability of 16th group hydrides decreases from H_2O to H_2PO

(R) From H_2O to H_2PO bond dissociation energy increases.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: C



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35. (A) Dioxygen does not react directly with Au and Pt

(R) au ad Pt are noble metals

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



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36. (A) Mn_2O_7 and CrO_3 are acidic oxides.

(R) In Mn_2O_7 and CrO_3 the Mn and Cr are in their highest oxidation states.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of
(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



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37. (A) SO_2 is reducing agent and TeO_2 is oxidising agent

(R) From SO_2 to TeO_2 acidic nature of dioxides increases.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



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38. (A) H_2O is a liquid while H_2S is gas at room temperature

(R) Both H_2O and H_2S are exothermic compounds

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: B



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39. (A) Ozone is thermodynamically unstable than oxygen.

(R) Decomosition of ozone into oxygen results in the liberation of heat and an increase in entropy.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: B



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40. (A) Conversion of PbS to PbSO_4 consumes four moles of ozone

(R) $\text{O}_3 \rightarrow \text{O}_2 + (\text{O})$

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

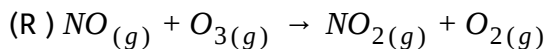
D. Both (A) and (R) are false

Answer: A



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41. (A) Exhaust systems of supersonic jet aeroplanes slowly depleting the concentration of ozone layer.



A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



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42. (A) The two oxygen-oxygen bond lengths in the ozone molecule are identical (128 pm)

(R) Ozone exhibit resonance.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: A



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- 43.** (A) In vapour state S_2 molecule is paramagnetic like O_2
- (R) S_2 molecule in vapour state contains two unpaired electrons in bonding molecular orbitals
- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



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44. (A) Sulphur dioxide acts as antichlor

(R) In presence of charcoal SO_2 combine with Cl_2 to form sulphuryl chloride

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



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45. (A) SO_2 is angular molecule

(R) In SO_2 sulphur exhibit SP^2 hybridisation

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



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46. (A) SO_2 acts as good reducing agent in aqueous solutions

(R) $\text{SO}_2 + 2\text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4 + 2(\text{H})$

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of

(A)

C. (A) is true but (R) is false

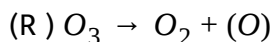
D. Both (A) and (R) are false

Answer: A



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47. (A) Ozone is used for bleaching oils, ivory, flour, starch ect.



A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of

(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



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48. (A) 369 K is considered as transition temperature of sulphur

(R) At 369 K both α and β sulphur are exist in equilibrium

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of

(A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



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49. (A) H_2SO_4 is used in the preparation of HCl from NaCl

(R) H_2SO_4 is lower volatile acid than HCl

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



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50. (A) Sulphuric acid forms two series of salts with alkalis

(R) Sulphuric acid is a dibasic acid

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: A



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51. (A) Ozone is a linear molecule.

(R) In a molecule of ozone, the central oxygen atom is attached with two more oxygen atoms.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: A



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LEVEL-I (EXERCISE)

1. The second most electronegative element in periodic table is

A. F

B. O

C. Cl

D. N

Answer: B



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2. Element with higher catenation capacity is

A. S

B. Se

C. Te

D. Po

Answer: A



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3. The most common oxidation state of VI A group elements is

A. -2

B. +2

C. +4

D. +6

Answer: A



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4. Chair form of S_6 rings are present in

- A. α - sulphur
- B. β - sulphur
- C. Engle's sulphur
- D. γ - sulphur

Answer: C



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5. The chalogen containing equal number of 's' and 'p' electrons is

- A. O
- B. S
- C. Mg

D. Te

Answer: A



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6. Most abundant element in earth crust is

A. O

B. Se

C. S

D. Te

Answer: A



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LIST-1

LIST-2

(A) Pyrolusite

(1) FeS_2

(B) Hematite

(2) ZnS

7. (C) Iron Pyrites

(3) Fe_2O_3

(D) Zinc blende

(4) MnO_2

(5) Fe_3O_4

The correct match is

A B C D

A. 4 5 1 3

A B C D

B. 3 5 1 2

A B C D

C. 4 3 1 2

A B C D

D. 3 4 1 2

Answer: C



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8. Oxygen cannot exhibit higher oxidation states due to

A. small size

B. more electronegativity

C. less density

D. absence of 'd' orbitals

Answer: D



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9. Magnetic moment of O_2 is nearly

A. 1.8 BM

B. 2.8 BM

C. 3.8 BM

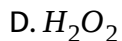
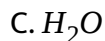
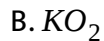
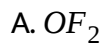
D. Zero

Answer: B



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10. Oxygen exhibits least oxidation state in



Answer: C



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11. The oxidation number of sulphur in S_8 , S_2F_2 and H_2S are

A. 0, +1 and -2

B. +2, +1 and -2

C. 0, +1 and +2

D. -2, +1 and -2

Answer: A



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12. Polyanion formation is maximum in

A. Nitrogen

B. Oxygen

C. Sulphur

D. Boron

Answer: C



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13. In a compound of sulphur, the sulphur atom is in second excited state.

The possible hybridisation of sulphur is

A. sp^2

B. sp^3

C. sp^3d^2

D. sp^2 (or) sp^3 (or) sp^3d^2

Answer: D



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14. The pair of exothermic hydrides of VI A group are

A. H_2O, H_2S

B. H_2O, H_2Se

C. H_2Se, H_2Te

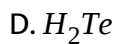
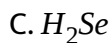
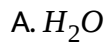
D. H_2S, H_2Te

Answer: A



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15. Which is non poisonous hydride ?

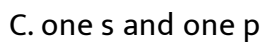


Answer: A



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16. Sulphur uses orbitals for bonding in H_2S



D. pure p orbitals

Answer: D



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17. (A): Thermal stability of the hydrides of VIA group elements decreases from $H_2O \rightarrow H_2Po$

(R): The heats of dissociation of M-H bond of hydrides of VIA group decreases down the group

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

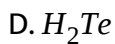
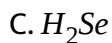
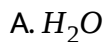
D. (A) is false but (R) is true

Answer: A



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18. A stronger reducing agent is

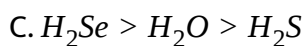
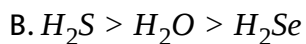
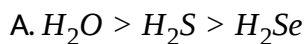


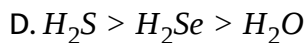
Answer: D



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19. Correct decreasing order of volatility is



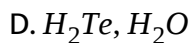
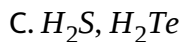
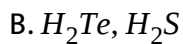
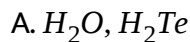


Answer: D



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20. The most acidic and thermally stable hydride of chalcogens are respectively

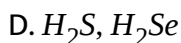
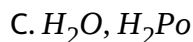
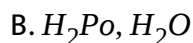
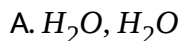


Answer: D



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21. In the hydrides of VIA elements largest bond angle and bond length is observed respectively in



Answer: C



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22. The effect of repulsion between the two lone pairs of electrons present on oxygen in H_2O molecule is

A. no change in H-O-H bond angle

B. increase in H-O-H bond angle

C. decrease in H-O-H bond angle

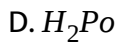
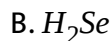
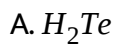
D. all atoms will be in one plane

Answer: C



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23. Which of the following is a weakest acid in its aqueous solution ?

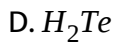
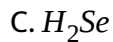
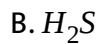
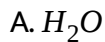


Answer: C



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24. Which of the following is least covalent hydride?



Answer: A



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25. The bond angle in H_2S is

A. $109^{\circ}28'$

B. $104^{\circ}51'$

C. 120°

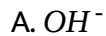
D. 92.5°

Answer: D



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26. Among the following, the weakest conjugate base is



Answer: D



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27. The geometry of H_2S and its dipole moment are

A. Angular and non zero

B. Angular and zero

C. Linear and non zero

D. Linear and zero

Answer: A



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28. In the hydrides of VI A group elements, the acidic strength gradually increases from top to bottom. This is due to

- A. decreases in the EN of the chalcogens
- B. increase in their K_a values
- C. increase in the metallic strength of chalcogen
- D. increase in the m.p. of chalcogen

Answer: B



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29. Oxygen is more electronegative than sulphur, yet H_2S is acidic while H_2O is neutral. This is because

- A. Water is highly associated compound
- B. H-S bond is weaker than H-O bond
- C. H_2S is a gas while H_2O is a liquid
- D. The molecular weight of H_2S is more

Answer: B



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30. In which of the following bond angle can not be explained by Valence Bond Theory?

- A. H_2O
- B. H_2Po
- C. H_2S

D. H_2Te

Answer: A



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31. The element of VI A group which cannot form hexahalides is

A. O

B. S

C. Se

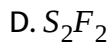
D. Te

Answer: A



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32. When sulphur is treated with F_2 , the main product formed is

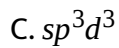
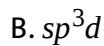
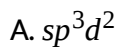


Answer: A



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33. The hybridization of $Sin SF_4$ is

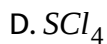
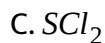
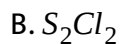


Answer: B



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34. Which of the following is foul smelling red liquid

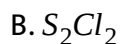
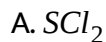


Answer: C



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35. Which of the following has open book-structure



D. SF_2

Answer: B



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36. Bond angles in SCl_2 and OF_2 respectively are

A. 107° , 101.5°

B. 103° , 109.5°

C. 101.5° , 105°

D. 103° , 103°

Answer: D



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37. In OF_2 molecule, the total number of bond pairs and lone pairs of electrons present respectively are

- A. 2, 6
- B. 2, 8
- C. 2, 10
- D. 2, 9

Answer: B



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38. The bond angle in $TeBr_2$ is

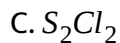
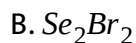
- A. 101.5°
- B. 98°
- C. 103°
- D. 90°

Answer: B



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39. Which among the following compound cannot be prepared by direct union of elements ?

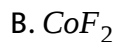


Answer: D



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40. SF_4 is obtained by treating sulphur with



Answer: C



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41. Wrong statement about O_2F_2 is

A. It is non-planar molecule

B. It is evolved when dil NaOH reacts with F_2

C. It is polar molecule

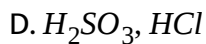
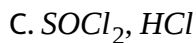
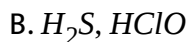
D. It has both polar and non-polar bonds.

Answer: B



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42. SCl_4 on hydrolysis gives



Answer: D



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43. $S + 2Cl_2 \xrightarrow{H_2O} X \rightarrow Y + HCl, Y \rightarrow Z + H_2O$. Oxidation state of S in 'Z' is

A. +1

B. +4

C. +6

D. +2

Answer: D



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44. The hydrolysis of which compound is an example of disproportionating reaction?

A. SCl_4

B. OF_2

C. S_2Cl_2

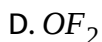
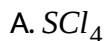
D. S_2Cl_2 and OF_2

Answer: C



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45. Which of the following is a liquid?

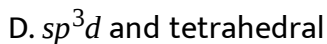


Answer: A



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46. The hybridisation of sulphur atom in SCl_4 and the shape of the molecule are



Answer: B



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47. When S_2Cl_2 is hydrolysed, the product formed is

A. HCl

B. SO_2

C. S

D. All

Answer: D



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LIST - 1 LIST - 2

A) SF_6 1) angular

B) SF_4 2) open book

48. C) SF_2 3) octahedral

D) S_2F_2 4) pyramidal

5) distorted tetrahedral

The correct match is

A.

A	B	C	D
1	2	3	4

B.

A	B	C	D
4	2	5	3

C.

A	B	C	D
2	4	1	5

D.

A	B	C	D
3	5	1	2

Answer: D



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49. $TeCl_4$ is expected to be

A. Tetrahedral

- B. Square planar
- C. Octahedral
- D. Trigonal bipyramid

Answer: D



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50. In SCl_2 the central atom involves

- A. sp^3 hybridization
- B. sp^3d hybridization
- C. sp^2d^2 hybridization
- D. dsp^2 hybridization

Answer: A



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51. $\text{NaOH} + \text{F}_2 \rightarrow$ pale yellow gas (X). The hybridisation and bond angle in X are

A. sp^3 , 103°

B. sp^3d^2 , 90°

C. sp^3 , 109.28°

D. sp^3d , 120°

Answer: A



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52. The total number of bond pairs and lone pairs in Se_2Br_2 molecule are respectively

A. 3, 10

B. 3, 8

C. 2, 6

D. 2, 10

Answer: A



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53. Which of the following can give an oxyacid when dissolved in H_2O ?

A. Cl_2O

B. SO_3

C. SO_2

D. All

Answer: D



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54. The oxide obtained in the roasting of ironpyrites

A. SO_2

B. SO_3

C. FeO

D. SO_2 and SO_3

Answer: A



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55. On passing SO_2 gas through an acidified solution of $K_2Cr_2O_7$

A. The solution turns blue

B. The solution is decolourised

C. SO_2 is reduced

D. Green $Cr_2(SO_4)_3$ is formed

Answer: D



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56. SO_2 bleaches by

- A. Reduction
- B. Oxidation
- C. Hydrolysis
- D. Acidic nature

Answer: A



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57. The hybridization of sulphur in SO_2 is:

- A. sp
- B. sp^3
- C. sp^2

D. dsp^2

Answer: C



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58. In SO_2 two oxygen atoms are linked to the sulphur atom through double bonds. The two π bonds are

A. both $p\pi - p\pi$

B. both $p\pi - d\pi$

C. both $d\pi - d\pi$

D. one $p\pi - p\pi$ and one $p\pi - d\pi$

Answer: D



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59. In solid cyclic form of SO_3 , each sulphur atom is surrounded by oxygen atoms

A. 4

B. 3

C. 5

D. 6

Answer: A



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60. The number of S-S bonds in sulphur trioxide trimer S_3O_9 is

A. Three

B. Two

C. One

D. Zero

Answer: D



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61. The type of bonds present in sulphuric anhydride are

- A. 3σ and three $p\pi - d\pi$
- B. 3σ , one $p\pi - p\pi$ and two $p\pi - d\pi$
- C. 2σ and three $p\pi - d\pi$
- D. 2σ and two $p\pi - d\pi$

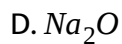
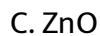
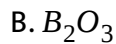
Answer: B



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62. Which is an amphoteric oxide ?

- A. SO_2

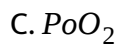
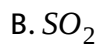


Answer: C



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63. Which of the following is least soluble in water?

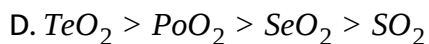
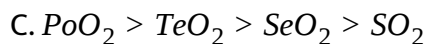
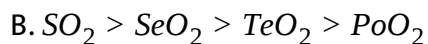
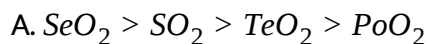


Answer: C



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64. The acidic character of dioxides of members of oxygen family decreases in the order

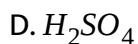
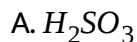


Answer: B



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65. During the bleaching action of SO_2 , it is converted to

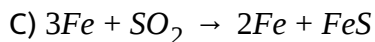
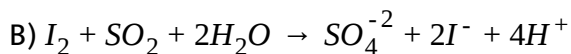
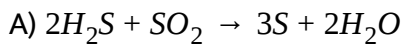


Answer: D



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66. Reducing property of SO_2 is shown in



A. A

B. B

C. A, B

D. A, C

Answer: B



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67. When moist coloured flowers are added into SO_2 gas the flowers are decolourised because

- A. SO_2 absorbs colouring matter
- B. SO_2 oxidised vegetable colouring matter
- C. SO_2 reduces vegetable colouring matter
- D. SO_2 gives colourless product

Answer: C



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68. Bond angle, bond length and hybridisation in SO_3 molecule respectively are

- A. 119.5° , 143nm , sp^2
- B. 119.5° , $143 \pm$, sp^2
- C. 119.5° , $143 \pm$, sp^3

D. 119.5, 143A⁰, sp^2

Answer: B



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69. Sulphurous anhydride is

A. SO_2

B. SO_3

C. HSO_3^-

D. SO_3^{2-}

Answer: A



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70. Number of ' σ ' and ' π ' bonds in solid SO_3 cyclic structure are

A. 12σ and 6π

B. 12σ and 12π

C. 6σ , and 12π

D. 6σ and 6π

Answer: A



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71. Which of the following dissolves in water but does not give any oxyacid solution ?

A. SO_2

B. OF_2

C. SCl_4

D. SO_3

Answer: B

72. The type of bonds present in sulphuric anhydride are

- A. 3σ and three $p\pi - d\pi$
- B. 3σ , one $p\pi - p\pi$ and two $p\pi - d\pi$
- C. 2σ and three $p\pi - d\pi$
- D. 2σ and two $p\pi - d\pi$

Answer: B

73. The ratio of $p\pi - d\pi$ bonds in SO_2 and SO_3 molecules

- A. 1 : 1
- B. 1 : 2
- C. 2 : 1

D. 2:3

Answer: B



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74. In γ -form of SO_3 , the hybridisation of sulphur is

A. sp

B. sp^3d

C. sp^2

D. sp^3

Answer: D



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75. X and Y are anhydrides of sulphurous and sulphuric acid respectively.

The hybridisation state and the shape of X and Y are

- | | X | Y |
|----|------------------|----------------------------|
| A. | sp^2 , angular | sp^2 , tetrahedral |
| B. | sp^2 , angular | sp^2 , angular |
| C. | sp^2 , angular | sp^2 , planar triangular |
| D. | sp^3 planar | sp^3 , planar |

Answer: C



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76. In $HO - \overset{\overset{O}{||}}{S} - OH$ the oxidation states of S are

- A. +4, - 2
- B. +4, 0
- C. +2, - 2

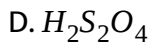
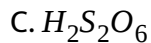
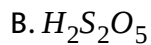
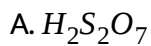
D. +4, - 4

Answer: A



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77. Acid that contains S - O - S linkage is

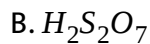
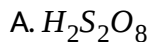


Answer: A

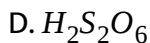


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78. Which of the following has S-S bond



C. mustard gas

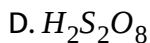
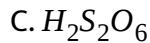
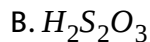
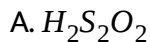


Answer: D



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79. Peroxy linkage is present in

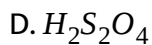
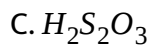
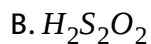
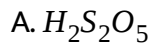


Answer: D



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80. Pyrosulphurous acid is

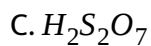
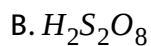
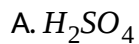


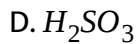
Answer: A



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81. Two tautomeric structures are possible for



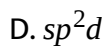
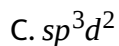
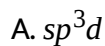


Answer: D



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82. Hybridisation of central sulphur in all oxo anions of sulphur is



Answer: B



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83. What is the number of sigma and pi bonds present in H_2SO_4 molecule ?

A. 6σ and 2π

B. 6σ and 0π

C. 2σ and 4π

D. 2σ and 2π

Answer: A



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84. Permonosulphuric acid is known as

A. Marshall's acid

B. Caro's acid

C. Sulphuric acid

D. Sulphurous acid

Answer: B



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85. An oxyacid of sulphur contained S = S linkage and the oxidation number of S in it is +6 and -2. It belongs to

A. - ous series

B. - ic series

C. peroxy series

D. thionic acid series

Answer: B



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86. Sulphate ion has geometry

- A. Trigonal
- B. Square planar
- C. Tetrahedral
- D. Angular

Answer: C



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87. The anhydride of pyrosulphuric acid is

- A. SO_2
- B. $S_2O_3^{2-}$
- C. SO_3
- D. $S_2O_7^{2-}$

Answer: C



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88. Number of hydroxyl groups present in pyrosulphuric acid is

A. 3

B. 4

C. 2

D. 1

Answer: C



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LIST - 1

LIST - 2

A) H_2SO_4

1) +4

B) $H_2(S)_nO_6$

2) +3

89.

C) H_2SO_3

3) +2, - 2

D) H_2SO_3

4) +6

5) +5, 0

The correct match is

- A.

	A	B	C	D
	2	5	2	4
- B.

	A	B	C	D
	3	2	1	4
- C.

	A	B	C	D
	4	5	1	2
- D.

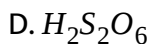
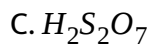
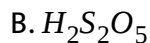
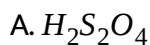
	A	B	C	D
	2	3	1	5

Answer: C



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90. Which of the following does not contain a symmetrical structure ?

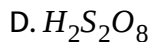
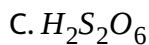
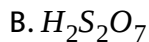
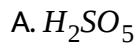


Answer: B



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91. The acid containing S - O - O - S bond is



Answer: D



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92. S-S bond is not present in

A. Pyro sulphurous acid

B. Dithionic acid

C. Dithionous acid

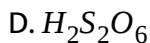
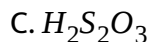
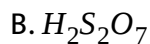
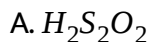
D. Pyro sulphuric acid

Answer: D



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93. In the following oxyacid of sulphur the two sulphur atoms exhibit the oxidation numbers of $+IV$ and $-II$

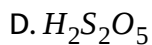
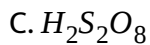
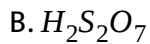
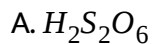


Answer: A



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94. Disulphuric acid is

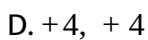
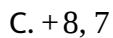
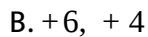
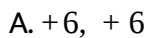


Answer: B



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95. Oxidation state of S in H_2SO_5 and $H_2S_2O_8$ respectively are



Answer: A



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96. Iron sulphide is heated in air to form A, an oxide of sulphur. A is dissolved in water to give an acid. The basicity of this acid is

A. 2

B. 3

C. 1

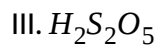
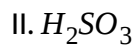
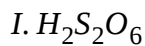
D. zero

Answer: A



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97. Identify the correct sequence of increasing number of π - bonds in the structures of the following molecules.



A. I, II, III

B. II, III, I

C. II, I, III

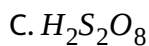
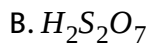
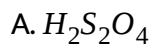
D. I, III, II

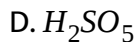
Answer: B



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98. Which of the following is a thioacid.





Answer: A



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99. The number of sigma and pi bonds in peroxodisulphuric acid are, respectively.

A. 9 and 4

B. 11 and 4

C. 4 and 8

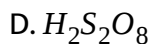
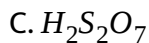
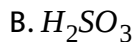
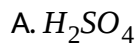
D. 4 and 9

Answer: B



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100. Oil of vitriol is

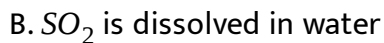
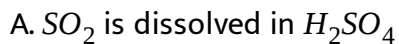


Answer: A



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101. In the preparation of H_2SO_4



Answer: C



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102. Poison for platinum, a catalyst in Contact process is

A. S

B. P

C. As

D. C

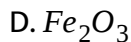
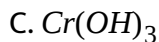
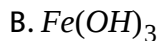
Answer: C



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103. In Contact process impurities of arsenic are removed by:

A. $Al(OH)_3$



Answer: B



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104. (A) : H_2SO_4 is called king of chemicals

(R) : H_2SO_4 has wide range of applications in industries.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A



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105. Pick out the ideal condition for H_2SO_4 manufactured by Contact process

- A. Low temperature, high pressure and high concentration of reactants
- B. Low temperature, low pressure and low concentration of reactants
- C. High temperature, high pressure and high concentration of reactants
- D. Low temperature, low pressure and high concentration of reactants

Answer: A



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106. Oxide of nitrogen used as a catalyst in the lead chamber process for the manufacture of sulphuric acid is

A. NO

B. N_2O

C. N_2O_3

D. N_2O_5

Answer: A



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107. (A): Direct absorption of SO_3 in H_2O is commercially not possible

(R): Direct absorption of SO_3 in water forms a mist of corrosive vapours.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of

(A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A



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108. The advantage of manufacturing H_2SO_4 by Contact process than other methods is

A) The acid obtained is highly pure and concentrated

B) It is comparatively cheap method.

C) The impurities can be tested and the reactants can be recycled.

A. The acid obtained is highly pure and concentrated

B. It is comparatively cheap method.

C. The impurities can be tested and the reactants can be recycled.

D. all

Answer: D



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109. (A) The formation of SO_3 by contact process is an example of heterogeneous catalysis

(R): The reactants and product are in different phase in the formation of SO_3 by contact process

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. (A) is false but (R) is true

Answer: C



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110. The electrolyte used in the preparation of ozone by Brodie's ozoniser is

A. $AgNO_3$ solution

B. $CuSO_4$ solution

C. NaCl solution

D. $MgCl_2$ solution

Answer: B



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111. O_3 is prepared by subjecting O_2 to silent electric discharge. The favourable conditions for the formation of ozone according to Le-chatlier's principle are

A. low temperature, low pressure

B. high temperature, high pressure

C. low temperature, high pressure

D. high temperature, low pressure

Answer: B



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112. Mercury sticks to glass when it comes in contact with

A. H_2O

B. HNO_3

C. I_2

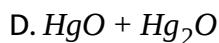
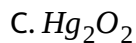
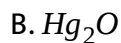
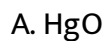
D. O_3

Answer: D



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113. The compound formed in the tailing of mercury by O_3 is

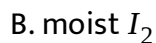
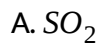


Answer: B



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114. Ozone does not give oxygen when reacted with

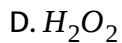


Answer: A



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115. Dry bleaching agent is



Answer: A



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116. Ozone blackens bright silver foil. Here the reaction involved

A. oxidation

B. reduction

C. tailing

D. oxidation followed by reduction

Answer: D



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117. A black compound 'X' when treated with O_3 turned white. The compound 'X' is

A. ZnS

B. PbS

C. CuS

D. Ag_2S

Answer: B



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118. The O - O bond length in Ozone is

A. 1.33\AA

B. 1.28\AA

C. 1.48\AA

D. 1.39\AA

Answer: B



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119. With respect to both oxygen and ozone, which one of the following statements is not correct?

A. They are allotropes together

B. oxygen is colourless while ozone is coloured

C. valency of oxygen is 2 in both

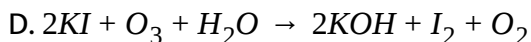
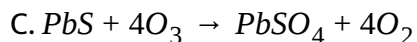
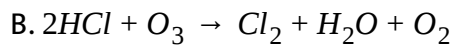
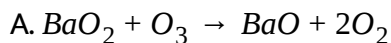
D. oxygen has 2 bonds and ozone has 3 bonds

Answer: C



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120. In which of the following reactions ozone acts as a reducing agent?

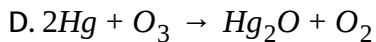
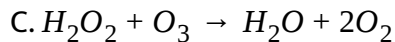
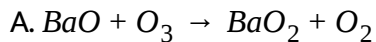


Answer: A



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121. Which one of the following reactions does not occur?



Answer: A



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122. The compound that cannot be oxidised by ozone is



Answer: A



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123. Select the wrong statement

- A. Ozone is a pale blue gas
- B. O_3 acts as both oxidant and reductant
- C. Ozone is used as an antiseptic inhaler
- D. Ozone is used in sterilization of water

Answer: C



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124. Regarding ozone the wrong statement is

- A. The bond angle is $116^{\circ}49'$
- B. O_3 acts as both oxidant and reductant
- C. O-O bond lengths are equal

D. It is paramagnetic

Answer: D



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125. Ozone uses all oxygen atoms in the oxidation reaction with

A. SO_2 only

B. Acidified $SnCl_2$ only

C. PbS only

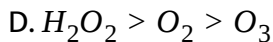
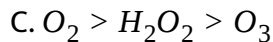
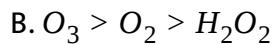
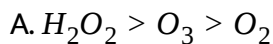
D. Both 1 and 2

Answer: D



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126. The correct order of O-O bond length in O_2 , H_2O_2 and O_3 is



Answer: A



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127. The incorrect statement among the following is

A. O_3 is soluble in glacial CH_3COOH

B. O_3 is a poisonous gas

C. O_3 is highly soluble in water

D. ozone is present in stratosphere

Answer: C



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128. When O_3 is passed through an aqueous solution of KI, the pH of the resulting solution is

- A. 7
- B. 6.8
- C. 2.8
- D. 10 - 14

Answer: D



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129. Which of the following conversion is not brought about by ozone

- A. HF to F_2
- B. Moist KI to I_2
- C. Ag_2O to Ag

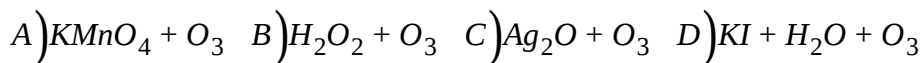
D. SnCl_2 to SnCl_4

Answer: A



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130. Which is a mutual reduction reaction



A. A, B

B. A, C

C. A, D

D. B, C

Answer: D



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131. Number of volumes of Oxygen that gives 4 volumes of Ozone is

A. 4

B. 6

C. 8

D. 2

Answer: B



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132. Starch paper moistened with KI solution turns blue in ozone because of

A. Iodine liberation

B. Oxygen liberation

C. Alkali formation

D. Ozone is acidic

Answer: A



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133. Which is not true for ozone ?

- A. It oxidizes lead sulphate
- B. It oxidizes potassium iodide
- C. It oxidizes HCl
- D. It can act as bleaching agent

Answer: A



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134. Reagent used to distinguish H_2O_2 and O_3 is

- A. PbS

B. Starch iodide

C. $KMnO_4$

D. Bleaching powder

Answer: C



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135. In the tailing of mercury ozone oxidises X to Y. X and Y are respectively

A. Hg, Hg(I)O

B. Hg, Hg(II)O

C. Hg(I)O, Hg(II)O

D. Hg(II)O, Hg(I)O

Answer: A



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136. Ethylene on reaction with ozone gives

- A. Glyoxal
- B. Formaldehyde
- C. Ethylene ozonide
- D. Acetaldehyde

Answer: C



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137. Which one of the following reactions does not occur?

- A. $BaO + O_3 \rightarrow BaO_2 + O_2$
- B. $PbS + 4O_3 \rightarrow PbSO_4 + 4O_2$
- C. $H_2O_2 + O_3 \rightarrow H_2O + 2O_2$
- D. $2Hg + O_3 \rightarrow Hg_2O + O_2$

Answer: A



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138. When hypo is reacted with dil.acid, the gas liberated is

A. SO_2

B. SO_3

C. H_2S

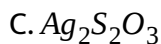
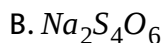
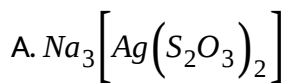
D. Sulphur vapour

Answer: A



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139. In photography hypo is used as a fixing agent. Here the compound formed is

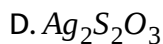
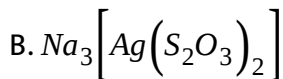
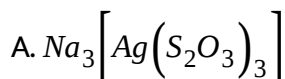


Answer: A



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140. When dil. Hypo is treated with excess $AgNO_3$ the chemical finally formed is



Answer: C



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141. Hypo never acts as a

- A. Antichlor
- B. Fixing agent
- C. Reductant
- D. Bleaching agent

Answer: D



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142. In the reaction of hypo with I_2 to form $Na_2S_4O_6$ and NaI , the equivalent weight of hypo is _____ (M is mol.wt. of hypo)

- A. M
- B. $M/2$

C. $M/4$

D. $M/6$

Answer: A



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143. In the reaction where hypo acts antichlore, hypo undergoes

A. oxidation

B. reduction

C. disproportionation

D. halogenation

Answer: A



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144. What is the oxidation number of sulphur in $Na_2S_4O_6$?

- A. +2
- B. +2.5
- C. 3.5
- D. -2.5

Answer: B



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145. The product obtained by passing through hypo solution are

- A. S, HCl, Na_2S
- B. S, HCl, Na_2SO_3
- C. S, HCl, Na_2SO_4
- D. $S, NaCl, H_2SO_4$

Answer: C



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146. When very dilute hypo is added to $AgNO_3$ solution gives 'X'. The oxidation state of central metal atom in 'X' is

A. +4

B. +2

C. +1

D. -1

Answer: C



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147. Iodine oxidises $S_2O_3^{2-}$ ion to 'X', change in oxidation state of sulphur

A. +3

B. +2

C. +0.5

D. +4

Answer: C



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148. Which of the following is not correct?



B. Ozone undergoes addition reaction with unsaturated carbon compounds.

C. Sodium thiosulphate reacts with I_2 to form sodium tetrathionate and sodium iodide

D. Ozone oxidises lead sulphide to lead sulphate

Answer: A



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149. Which of the following is not correct

- A. Iodine oxidizes sodium thiosulphate to sodium tetrathionate
- B. Sodium thiosulphate is soluble in water
- C. Ozone is used to locate the presence of unsaturation in alkenes
- D. Sodium thiosulphate reacts reacts with iodine to form sodium sulphate

Answer: D



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1. What is the difference in maximum atomicity of oxygen and sulphur?

A. 2

B. 3

C. 4

D. 5

Answer: D



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2. What is the maximum number of 'S' atoms in a single plane of S_8 molecule.

A. 4

B. 2

C. 3

D. 6

Answer: A



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3. Which of the following forms black ppt. with H_2S in acidified solution?



Answer: B



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4. Which of the following give ppt. with H_2S only in alkaline medium?



B. Pb^{2+}

C. Cu^{2+}

D. Bi^{3+}

Answer: A



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5. H_2S is more volatile than water because

A. S' is more electro negative than 'O'

B. O' is more electro negative than 'S'

C. H_2O shows H-bonding

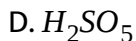
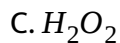
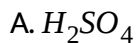
D. H_2O bond angle is more than H_2S

Answer: C



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6. Weak dibasic acids among the following



Answer: B::C



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7. $SOCl_2$ can act as Lewis acid as well as Lewis base because

A. sulphur has a pair of electrons to donate

B. it has empty d-orbital to accept electrons

C. sulphur is a non metal

D. chlorine is more electronegative

Answer: A::B



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8. In presence of moisture, SO_2 can

A. Lose electrons

B. Gain electrons

C. Act as oxidant

D. All

Answer: A



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9. SO_2 is obtained when the following are heated in air

A. S

B. FeS_2

C. HI

D. HIO_3

Answer: A::B



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10. In the reaction $PbO_2 + SO_2 \rightarrow PbSO_4$

A. Lead is reduced from Pb^{4+} to Pb^{2+}

B. SO_2 is oxidised to sulphate

C. Oxygen undergoes disproportionation

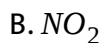
D. Pb is neither oxidised nor reduced

Answer: A::B



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11. A gas X turns lime water milky. The milkiness disappears if excess of 'X' is passed. Milkiness reappears on heating the colourless solution. The gas is

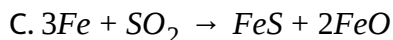
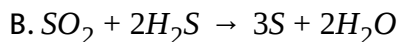
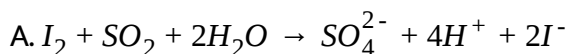


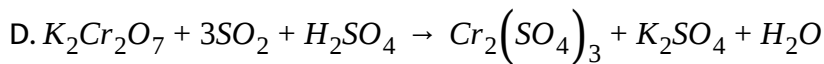
Answer: A::D



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12. In which of the following reactions, SO_2 acts as an oxidising agent?





Answer: B::C



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13. Which of the following are amphoteric ?

A. BeO

B. Al_2O_3

C. ZnO

D. SO_2

Answer: A::B::C



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14. Which of the following statement(s) is (are) correct ?

- A. SO_2 dissolves in water and forms sulphurous acid
- B. SO_2 acts as a bleaching agent
- C. SO_2 has pungent odour
- D. SO_2 acts only as oxidizing agent

Answer: A::B::C



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15. Which of the following statement(s) is (are) true for SO_2 ?

- A. It is a V-shaped molecule
- B. The O-S-O bond angle is $119^{\circ}30'$
- C. The S-O bond length is 143 pm
- D. It is a linear molecule

Answer: A::B::C



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16. Sulphuric acid can be used as:

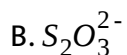
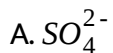
- A. Hygroscopic agent
- B. oxidising agent
- C. sulphonating agent
- D. efflorescent

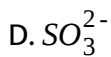
Answer: A::B::C



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17. Which of the following ions give ppt. with $BaCl_2$ solution?



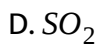
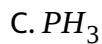


Answer: A::C::D



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18. Which of the following gases can be collected by downward displacement of water?



Answer: A::B::C



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19. Oxygen is not evolved when:

A. ZnO is heated with NaOH

B. NH_4NO_3 is heated

C. Na_2O_2 reacts with water

D. KClO_3 is heated

Answer: A::B



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20. In the reaction $\text{H}_2\text{S} + \text{O}_3 \rightarrow \dots\dots\dots$ the products are:

A. H_2O

B. S

C. O_2

D. $\text{SO}_2 + \text{H}_2$

Answer: A::B::C



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21. Which reagent does not give oxygen as one of the product during oxidation with ozone?

A. SO_2

B. $SnCl_2/HCl$

C. H_2S

D. PbS

Answer: A::B



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22. Which of the following react with dilute H_2SO_4 to form H_2 .

A. Al

B. Pb

C. Zn

D. Mg

Answer: A::C::D



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23. The compound which gives carbon with conc. H_2SO_4

A. Sugar

B. Wood

C. Starch

D. Alcohol

Answer: A::B::C



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24. The following reactions represents the dehydrating property of H_2SO_4

- A. Charring of sugar
- B. formation of Diethyl ether from Ethyl alcohol
- C. formation of ethylene from ethyl alcohol
- D. reaction with NaOH

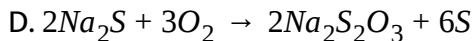
Answer: A::B::C



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25. Spring's reaction is / are

- A. $Na_2S + Na_2SO_3 + I_2 \rightarrow Na_2S_2O_3 + 2NaI$
- B. $Na_2SO_3 + S \rightarrow Na_2S_2O_3$
- C. $2Na_2S + SO_2 + Na_2CO_3 \rightarrow 3Na_2S_2O + CO_2$

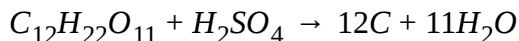


Answer: A



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26. Certain reactions regarding H_2SO_4 are given



These reactions shows that

- A. it is a dibasic acid
- B. charring agent
- C. it is a dehydrating agent
- D. it can form two types of salts

Answer: A::B::C::D



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27. Hypo acts as a fixing agent. The correct statements are

- A. It gives collodial sulphur as a precipitate
- B. It dissolve unreacted AgBr from photographic emulsion
- C. It forms a complex $Na_3\left[Ag\left(S_2O_3\right)_2\right]$
- D. It forms a complex $Na_3\left[Ag_2\left(S_2O_3\right)\right]$

Answer: B::C



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28. Which of the following statements regarding sulphur is incorrect ?

- A. SO_2 molecule is paramagnetic
- B. The vapour at $200^\circ C$ consists mostly of S_8 rings
- C. At $600^\circ C$ by gas mainly consists of S_2 molecules

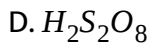
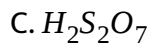
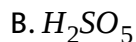
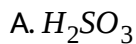
D. The oxidation state of sulphur is never less than +4 in its compounds

Answer: D



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29. Sulphur trioxide gas when dissolved in H_2SO_4 the product obtained is :



Answer: C



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1. Passage-I :

Metallic sulphates can be obtained by reacting the metals (above hydrogen in ECS), or its oxide, hydroxide or carbonate with dil. H_2SO_4 .

Group IA metals also form hydrogen sulphates which can be isolated in solid. In general metal sulphates are soluble in water and crystallize with water of crystallization. Sulphates are thermally more stable than nitrates.

Among the metals given below, which metal will not give its sulphate on treatment with dil. H_2SO_4 .

A. Ni

B. Cr

C. Co

D. Cu

Answer: D



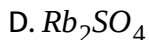
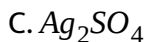
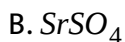
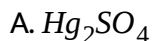
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2. Passage-I :

Metallic sulphates can be obtained by reacting the metals (above hydrogen in ECS), or its oxide, hydroxide or carbonate with dil. H_2SO_4 .

Group IA metals also form hydrogen sulphates which can be isolated in solid. In general metal sulphates are soluble in water and crystallize with water of crystallization. Sulphates are thermally more stable than nitrates.

Select the sulphate which is water soluble:



Answer: D



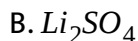
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3. Passage-I :

Metallic sulphates can be obtained by reacting the metals (above hydrogen in ECS), or its oxide, hydroxide or carbonate with dil. H_2SO_4 .

Group IA metals also form hydrogen sulphates which can be isolated in solid. In general metal sulphates are soluble in water and crystallize with water of crystallization. Sulphates are thermally more stable than nitrates.

Which metal sulphate will decompose into SO_3 and metal oxide when heated:



Answer: C

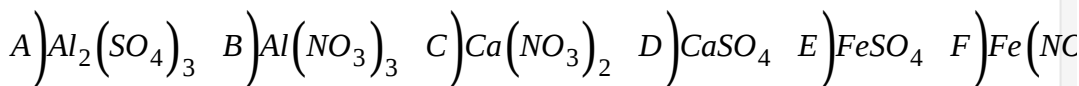


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4. Passage-I :

Metallic sulphates can be obtained by reacting the metals (above hydrogen in ECS), or its oxide, hydroxide or carbonate with dil. H_2SO_4 . Group IA metals also form hydrogen sulphates which can be isolated in solid. In general metal sulphates are soluble in water and crystallize with water of crystallization. Sulphates are thermally more stable than nitrates.

Select the thermally more stable salt from given pairs:



A. A,C,E

B. A,D,E

C. B,C,F

D. B,D,E

Answer: B

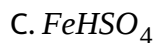


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5. Passage-I :

Metallic sulphates can be obtained by reacting the metals (above hydrogen in ECS), or its oxide, hydroxide or carbonate with dil. H_2SO_4 . Group IA metals also form hydrogen sulphates which can be isolated in solid. In general metal sulphates are soluble in water and crystallize with water of crystallization. Sulphates are thermally more stable than nitrates.

Select the stable hydrogen sulphate which can be obtained in solid state:



D. All of these

Answer: A



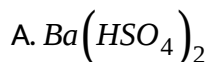
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6. Passage-I :

Metallic sulphates can be obtained by reacting the metals (above hydrogen in ECS), or its oxide, hydroxide or carbonate with dil. H_2SO_4 .

Group IA metals also form hydrogen sulphates which can be isolated in solid. In general metal sulphates are soluble in water and crystallize with water of crystallization. Sulphates are thermally more stable than nitrates.

When $BaCl_2$ solution is added in aq. Solution of $NaHSO_4$ a white ppt. is obtained which is of:



D. None of these

Answer: B



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7. Passage-II :

Sulphuric acid is considered as the king of chemicals. The prosperity of any country is measured by the amount of sulphuric acid it consumes.

Sulphuric acid is, thus a substance of very great commercial importance as it is used practically in every important industry. This is due to the following properties of sulphuric acid

Sulphuric acid has very corrosive action on skin because:

- A. it reacts with proteins
- B. it acts as an oxidizing agent
- C. it acts as a dehydrating agent
- D. it acts as a dehydrating agent and absorption of water is highly exothermic

Answer: D



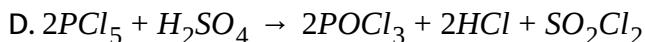
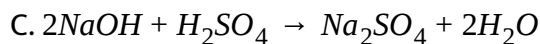
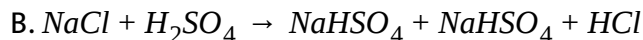
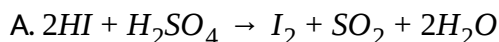
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8. Passage-II :

Sulphuric acid is considered as the king of chemicals. The prosperity of any country is measured by the amount of sulphuric acid it consumes.

Sulphuric acid is, thus a substance of very great commercial importance as it is used practically in every important industry. This is due to the following properties of sulphuric acid

Which of the following reactions predict the oxidizing behavior of H_2SO_4 ?



Answer: A



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9. Passage-II :

Sulphuric acid is considered as the king of chemicals. The prosperity of any country is measured by the amount of sulphuric acid it consumes.

Sulphuric acid is, thus a substance of very great commercial importance as it is used practically in every important industry. This is due to the following properties of sulphuric acid

The formation of nitroglycerine is done by the use of concentrated nitric and concentrated sulphuric acid. The process of conversion of glycerine into nitroglycerine is termed as:

A. sulphonation

B. oxidation

C. nitration

D. dehydration

Answer: C



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10. Passage-II :

Sulphuric acid is considered as the king of chemicals. The prosperity of any country is measured by the amount of sulphuric acid it consumes.

Sulphuric acid is, thus a substance of very great commercial importance as it is used practically in every important industry. This is due to the following properties of sulphuric acid

Only carbon is obtained when concentrated H_2SO_4 is added to :

- A. formic acid
- B. cane sugar
- C. oxalic acid
- D. ethyl alcohol

Answer: B



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11. Passage-II :

Sulphuric acid is considered as the king of chemicals. The prosperity of any country is measured by the amount of sulphuric acid it consumes.

Sulphuric acid is, thus a substance of very great commercial importance as it is used practically in every important industry. This is due to the following properties of sulphuric acid

Concentrated H_2SO_4 cannot be used to prepare HBr or HI from KBr or KI because it :

- A. reacts too slowly with KBr or KI
- B. reduces HBr or HI
- C. Oxidizes HBr or HI
- D. Oxidizes KBr to $KBrO_3$ or KI to KIO_3 .

Answer: C



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12. Passage-III :

The binary compounds of oxygen with other elements are called oxides. They are classified either depending upon their acid - base characteristics or on the basis of oxygen content.

a) Normal oxides : These oxides which contain oxygen atoms as permitted by the normal oxidation number, i.e., -2. Normal oxide may be acidic, basic, amphoteric or neutral.

b) Polyoxides : The oxides which contain oxygen atoms different than those permitted by the normal oxidation number of -2.

i) Peroxides : Two oxygen atoms are linked to each other and oxygen has - I oxidation number. They contain $(O - O)^2$ unit.

ii) Superoxides : These oxides contain $(O - O)^{-1}$ units, i.e., each O-atom has oxidation number -1/2.

c) Suboxides : These contain low content of oxygen than expected.

d) Mixed oxides : These oxides are made of two simpler oxides.

Which pair of species is referred to as suboxides?

A. CO, NO

B. SO_2 , CaO

C. N_2O , CO

D. S_2O , C_3O_2 .

Answer: D



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13. Passage-III :

The binary compounds of oxygen with other elements are called oxides. They are classified either depending upon their acid - base characteristics or on the basis of oxygen content.

a) Normal oxides : These oxides which contain oxygen atoms as permitted by the normal oxidation number, i.e., -2. Normal oxide may be acidic, basic, amphoteric or neutral.

b) Polyoxides : The oxides which contain oxygen atoms different than those permitted by the normal oxidation number of -2.

i) Peroxides : Two oxygen atoms are linked to each other and oxygen has - I oxidation number. They contain $(O - O)^2$ unit.

ii) Superoxides : These oxides contain $(O - O)^{-1}$ units, i.e., each O-atom

has oxidation number $-1/2$.

c) Suboxides : These contain low content of oxygen than expected.

d) Mixed oxides : These oxides are made of two simpler oxides.

Which of the following pairs contains neutral oxides ?

A. SO_2 , SO_3

B. N_2O_3 , N_2O_5

C. CO , NO

D. Na_2O , CaO

Answer: C



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14. Passage-III :

The binary compounds of oxygen with other elements are called oxides.

They are classified either depending upon their acid - base characteristics or on the basis of oxygen content.

a) Normal oxides : These oxides which contain oxygen atoms as

permitted by the normal oxidation number, i.e., -2. Normal oxide may be acidic, basic, amphoteric or neutral.

b) Polyoxides : The oxides which contain oxygen atoms different than those permitted by the normal oxidation number of -2.

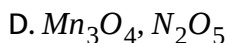
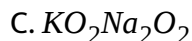
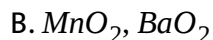
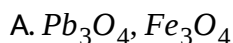
i) Peroxides : Two oxygen atoms are linked to each other and oxygen has -1 oxidation number. They contain $(O - O)^2$ unit.

ii) Superoxides : These oxides contain $(O - O)^{-1}$ units, i.e., each O-atom has oxidation number -1/2.

c) Suboxides : These contain low content of oxygen than expected.

d) Mixed oxides : These oxides are made of two simpler oxides.

Which of the following pairs contains mixed oxides?



Answer: A



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15. Passage-III :

The binary compounds of oxygen with other elements are called oxides. They are classified either depending upon their acid - base characteristics or on the basis of oxygen content.

a) Normal oxides : These oxides which contain oxygen atoms as permitted by the normal oxidation number, i.e., -2. Normal oxide may be acidic, basic, amphoteric or neutral.

b) Polyoxides : The oxides which contain oxygen atoms different than those permitted by the normal oxidation number of -2.

i) Peroxides : Two oxygen atoms are linked to each other and oxygen has -1 oxidation number. They contain $(O - O)^2$ unit.

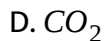
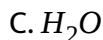
ii) Superoxides : These oxides contain $(O - O)^{-1}$ units, i.e., each O-atom has oxidation number -1/2.

c) Suboxides : These contain low content of oxygen than expected.

d) Mixed oxides : These oxides are made of two simpler oxides.

Which of the following oxides is paramagnetic in nature?

A. KO_2



Answer: A



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16. Passage-IV :

Sulphur and rest of the elements of group 16 are less electronegative than oxygen. Therefore, their atoms cannot take up electrons easily. They can acquire ns^2np^6 configuration by sharing two electrons with the atoms of other elements and thus, exhibit +2 oxidation state in their compounds. In addition to this, their atoms have vacant d-orbitals in their valence shell to which electrons can be promoted from the p and s-orbitals of the shell. As a result, they can show +4 and +6 oxidation states shell.

The nature of the compounds of sulphur having +4 oxidation state is :

- A. act as oxidizing agents
- B. act as reducing agents
- C. act as oxidizing as well as reducing agents
- D. cannot be predicted

Answer: C



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17. Passage-IV :

Sulphur and rest of the elements of group 16 are less electronegative than oxygen. Therefore, their atoms cannot take up electrons easily. They can acquire ns^2np^6 configuration by sharing two electrons with the atoms of other elements and thus, exhibit +2 oxidation state in their compounds. In addition to this, their atoms have vacant d-orbitals in their valence shell to which electrons can be promoted from the p and s-orbitals of the shell. As a result, they can show +4 and +6 oxidation states shell.

Like sulphur, oxygen does not show +4 and +6 oxidation states. The reason is :

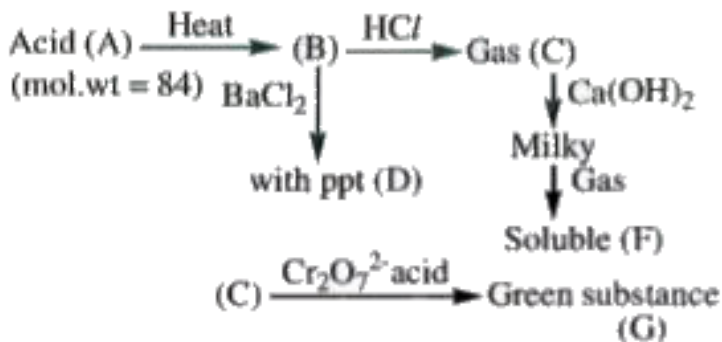
- A. that oxygen is a gas while sulphur is a solid
- B. that oxygen has high ionization enthalpies in comparison to sulphur
- C. that oxygen has high electron affinity in comparison to sulphur
- D. that oxygen has no d-orbitals in its valence shell

Answer: D

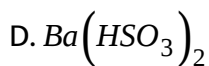


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18. Passage - V:



Reference to the above flow diagram whit ppt (D) is -

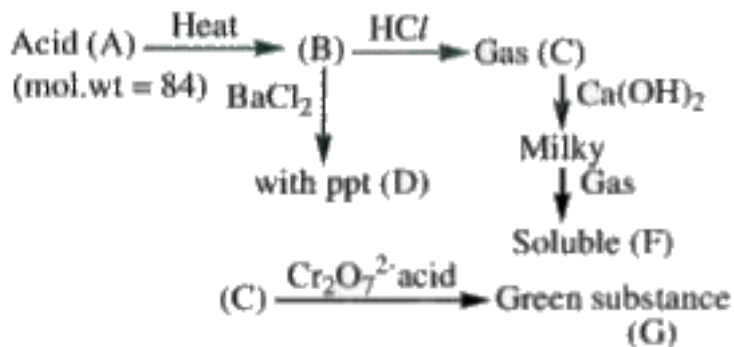


Answer: C

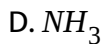


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19. Passage - V:



Reference to the above flow diagram Gas (C) is

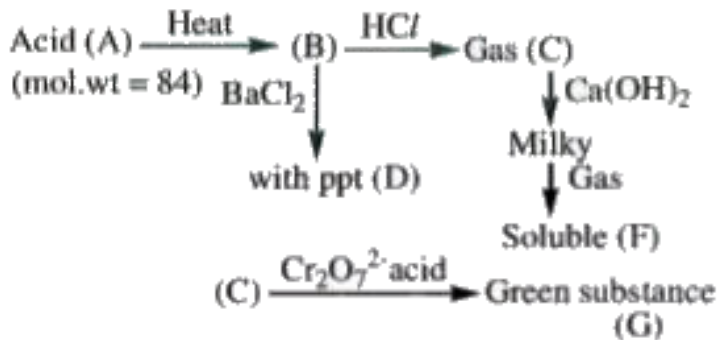


Answer: B



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20. Passage - V:



Reaction, $C \rightarrow G$ is

- A. hydrolysis
- B. neutralization
- C. precipitation
- D. Redox reaction

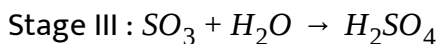
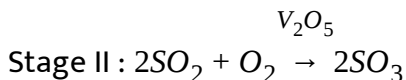
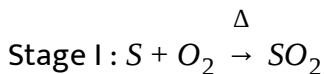
Answer: D



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21. Passage - VI :

Industrially sulphuric acid is produced by the following steps:



Since the reaction between SO_3 and H_2O is violent,

SO_3 is passed into 98 % H_2SO_4 to produce oleum ($H_2S_2O_7$)

Pure H_2SO_4 does not react with metal because -

- A. Pure H_2SO_4 does not contain any water
- B. Pure H_2SO_4 is not oxidising agent
- C. Pure H_2SO_4 is strongly H - bonded
- D. Pure H_2SO_4 does not contain any SO_3

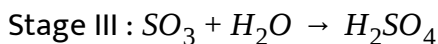
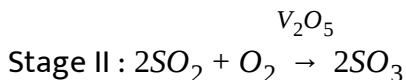
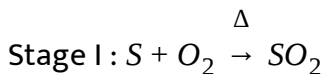
Answer: C



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22. Passage - VI :

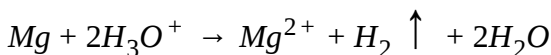
Industrially sulphuric acid is produced by the following steps:



Since the reaction between SO_3 and H_2O is violent,

SO_3 is passed into 98 % H_2SO_4 to produce oleum ($H_2S_2O_7$)

Ionicly the reaction between H_2SO_4 & Mg may be presented as,



Therefore, in the given reaction -

A. oxidising agent is $H^+ (H_2O)$

B. reducing agent is $H^+ (H_2O)$

C. oxidising agent is SO_4^{2-}

D. oxidising agent are SO_4^{2-} & H_3O^+ both

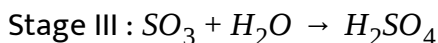
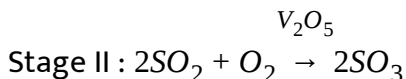
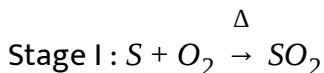
Answer: A



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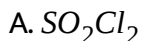
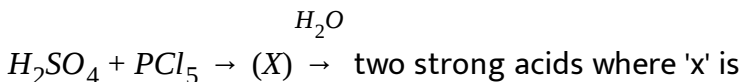
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Industrially sulphuric acid is produced by the following steps:



Since the reaction between SO_3 and H_2O is violent,

SO_3 is passed into 98 % H_2SO_4 to produce oleum ($H_2S_2O_7$)



Answer: A



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24. Passage - VII :

An aqueous solution of a gas (x) gives the following reactions

- (1) It decolourises an acidified $K_2Cr_2O_7$ solution
- (2) On boiling with H_2O_2 cooling it and then adding on aqueous solution of $BaCl_2$, a precipitation insoluble in dilute HCl is obtained
- (3) On passing H_2S in the solution white turbidity (y) is obtained
- (4) When gas 'x' is heated with concentrated HNO_3 evolves a brown coloured gas (A)
- (5) When 'x' also dissolves in Na_2SO_3 solution on heating a clear solution (C) is formed.

Gas 'x' is

A. SO_3

B. S

C. SO_2

D. H_2S

Answer: C

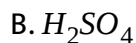


25. Passage - VII :

An aqueous solution of a gas (x) gives the following reactions

- (1) It decolourises an acidified $K_2Cr_2O_7$ solution
- (2) On boiling with H_2O_2 cooling it and then adding on aqueous solution of $BaCl_2$, a precipitation insoluble in dilute HCl is obtained
- (3) On passing H_2S in the solution white turbidity (y) is obtained
- (4) When gas 'x' is heated with concentrated HNO_3 evolves a brown coloured gas (A)
- (5) When 'x' also dissolves in Na_2SO_3 solution on heating a clear solution (C) is formed.

y is



Answer: D



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26. Passage - VII :

An aqueous solution of a gas (x) gives the following reactions

- (1) It decolourises an acidified $K_2Cr_2O_7$ solution
- (2) On boiling with H_2O_2 cooling it and then adding on aqueous solution of $BaCl_2$, a precipitation insoluble in dilute HCl is obtained
- (3) On passing H_2S in the solution white turbidity (y) is obtained
- (4) When gas 'x' is heated with concentrated HNO_3 evolves a brown coloured gas (A)
- (5) When 'x' also dissolves in Na_2SO_3 solution on heating a clear solution (C) is formed.

The brown coloured gas is

A. NO

B. NO_2

C. SO_2

D. H_2S

Answer: B



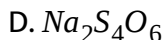
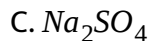
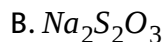
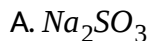
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27. Passage - VII :

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- (1) It decolourises an acidified $K_2Cr_2O_7$ solution
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- (4) When gas 'x' is heated with concentrated HNO_3 evolves a brown coloured gas (A)
- (5) When 'x' also dissolves in Na_2SO_3 solution on heating a clear solution (C) is formed.

"C" is



Answer: B



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28. Passage - VIII :

In this passage five observation are given. Question are asked with reference to the given observations

Observation (i) Gaseous oxygen is colourless whereas liquid and solid oxygen are coloured substance.

Observation (ii) When O_2 is cooled below a certain temperature its paramagnetic character decreases.

Observation (iii) In ice H_2O molecules are H bonded

Observation (iv) Ozone is responsible for tailing of $\text{Hg}(l)$

Observation (v) $O_3(g)$ is almost unavailable in lower atmosphere

Which of the following explain the observation (i)?

- A. in liquid and solid oxygen there is a transition of bonding electrons from the triplet state to the singlet state
- B. in liquid and solid oxygen there is a transition of antibonding electrons from the triplet state to the singlet state
- C. in liquid and solid oxygen the two unpaired electrons of gaseous oxygen are paired up
- D. (a) and (c)

Answer: B



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29. Passage - VIII :

In this passage five observation are given. Question are asked with reference to the given observations

Observation (i) Gaseous oxygen is colourless whereas liquid and solid oxygen are coloured substance.

Observation (ii) When O_2 is cooled below a certain temperature its paramagnetic character decreases.

Observation (iii) In ice H_2O molecules are H bonded

Observation (iv) Ozone is responsible for tailing of $Hg(l)$

Observation (v) $O_3(g)$ is almost unavailable in lower atmosphere

Which of the following explain the observation (ii)?

- A. because below a certain temperature $O_2(g)$ is partially dimerized
- B. the unpair electrons of $O_2(g)$ is paired up in some O_2 molecules
- C. $O_2(g)$ is partially dissociated to atomic oxygen
- D. $O_2(g)$ is converted partially to ozone

Answer: B



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30. Passage - VIII :

In this passage five observation are given. Question are asked with reference to the given observations

Observation (i) Gaseous oxygen is colourless whereas liquid and solid oxygen are coloured substance.

Observation (ii) When O_2 is cooled below a certain temperature its paramagnetic character decreases.

Observation (iii) In ice H_2O molecules are H bonded

Observation (iv) Ozone is responsible for tailing of $Hg(l)$

Observation (v) $O_3(g)$ is almost unavailable in lower atmosphere

O_3 on reaction with $Hg(l)$ as per observation (iv) produce -

A. HgO

B. Hg_2O

C. HgO_2

D. Hg_2O_3

Answer: B



31. Passage - VIII :

In this passage five observation are given. Question are asked with reference to the given observations

Observation (i) Gaseous oxygen is colourless whereas liquid and solid oxygen are coloured substance.

Observation (ii) When O_2 is cooled below a certain temperature its paramagnetic character decreases.

Observation (iii) In ice H_2O molecules are H bonded

Observation (iv) Ozone is responsible for tailing of $Hg(l)$

Observation (v) $O_3(g)$ is almost unavailable in lower atmosphere

Reference to observation (v) $O_3(g)$ is unavailable in lower atmosphere because -

A. at lower altitude O_3 produced is decomposed to O_2 due to the higher temperature

- B. at lower temperature there is noise pollution, therefore O_3 produced is decomposed to O_2
- C. $O_3(g)$ is heavier than air, hence available in the coal mines
- D. in the lower altitude UV radiation of higher frequencies required for the dissociation of gaseous O_2 to atomic oxygen, are unavailable

Answer: D



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LEVEL-II LECTURE SHEET (EXERCISE-III Match the following questions)

COLUMN-I COLUMN-II

(A) SO_2 (p) +2 and '0' states of 'S'

(B) H_2S (q) Trimer solid

1. (C) SO_3 (r) Reductant

(D) S_6O (s) Oxidant

(t) sp^2 sulphur



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- | COLUMN-I | COLUMN-II |
|-----------------------------|---------------------|
| (A)Crown shape | (p) S_2Cl_2 |
| 2. (B)Angular shape | (q) S_8 molecule |
| (C)Planar trigonal | (r) O_3 molecule |
| (D) H_2O_2 like structure | (s) SO_3 molecule |

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- | COLUMN-I | COLUMN-II |
|-----------------------------|------------------------------------|
| (A)Thermal stability | (p) $H_2Te > H_2Se > H_2S > H_2O$ |
| 3. (B)Acidic nature | (q) $H_2O > H_2S > H_2Se > H_2Te$ |
| (C)Boiling points | (r) $H_2S < H_2Se < H_2Te < H_2O$ |
| (D) $\angle MMH$ Bond angle | (s) $H_2S > H_2Se > H_2Te = H_2Po$ |

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- | COLUMN-I | COLUMN-II |
|--|-----------|
| (A)Number of $p\pi - d\pi$ type π bonds in SO_2 | (p)2 |
| 4. (B)Number of $p\pi - d\pi$ type π bonds in SO_3 | (q)1 |
| (C)Number of $p\pi - d\pi$ type π bonds in $H_2S_2O_5$ | (r)4 |
| (D)Number of $p\pi - d\pi$ type π bonds in $H_2S_2O_7$ | (s)3 |

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COLUMN-I

COLUMN-II

(A) $\angle \text{OSO}$ in SO_2 (p) 120°

5. (B) $\angle \text{OSO}$ in SO_3 (q) 103°

(C) $\angle \text{CISCI}$ in SCl_2 (r) 104°

(D) $\angle \text{SSCl}$ in S_2Cl_2 (s) $119^\circ 30'$



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6. Match List-I with List-II and select the correct answer using the codes given below the lists.

COLUMN-I

COLUMN-II

(A) Engle's sulphur

(p) Rings, Chair conformation, unstable

(B) Sulphur

(q) Fibrous or rubber like

(C) Rhombic sulphur

(r) Crystalline form yellow crystals

(D) monoclinic sulphur

(s) Puckered S_8 rings crown conformation



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COLUMN-I

(A)Platinum

7. (B) V_2O_5

(C)Iron

(D)Cobalt chloride

COLUMN-II

(p)Decomposition of bleaching powder

(q)Manufacturing of HNO_3

(r)Manufacturing of H_2SO_4

(s)manufacturing of NH_3



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COLUMN-I

(A)Oleum

8. (B)Peroxy disulphuric acid

(C)Peroxy monosulphuric acid

(D)Chamber Crystals

COLUMN-II

(p) NO , HSO_4

(q) H_2SO_5

(r) $H_2S_2O_8$

(s) $H_2SO_4 \cdot xSO_3$



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9.

COLUMN-I

(A)Sulphur dioxide

(B)Oxygen

(C)Ozone

(D)Hydrogen sulphide

COLUMN-II

(p)Laboratory reagent used during salt analysis

(q)Detection of position double bond in organic compound

(r)Antichlor

(s)Paramagnetic



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COLUMN-I

COLUMN-II

(A) Sulphur (S_8)

(p) Oleum

10. (B) Sulphuric acid

(q) Vulcanizing rubber

(C) Fuming sulphuric acid

(r) Marshall's acid

(D) Peroxy disulphuric acid

(s) sp^3 only



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LEVEL-II LECTURE SHEET (EXERCISE - IV Integer answer type Questions)

1. The atomicities of oxygen and sulphur are different. What is the ratio of the atomicities of sulphur to oxygen ?



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2. Peroxy links are present in H_2SO_5 and $H_2S_2O_8$. How many number of peroxy bonds are present in each acid?



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3. Maximum number of hydroge bonds that one water molecle is capable of forming is



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4. Ozone tarnishes silver metal. How many number of moles of O_2 are evolved?



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5. During ozonolysis of 1mole of benzene, number of moles of ozone consumed is



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6. Sulphur is available as various sulphates. A 'Mg' salt called Epsom contains how many number of H_2O molecules?

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7. In SF_6 molecule, is formed in n^{th} excited state of 's'. What is n ?

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8. How many number of hybrid orbitals are present in SO_2 ?

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9. The oxidation number of sulphur in caro's acid is +x. What is value of x.

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1. The valency of sulphur in SO_4^{2-} is :

A. 2

B. 1

C. 4

D. 6

Answer: D



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2. Which of the following bonds has the highest energy?

A. Se-Se

B. Te-Te

C. S-S

D. O-O

Answer: C



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3. H_2S when passed through dil HNO_3 gives -

- A. Rhombic sulphur
- B. monoclinic sulphur
- C. Colloidal sulphur
- D. Plastic sulphur

Answer: C



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4. The para magnetic nature of oxygen is best explained by

- A. VB theory
- B. VSEPR theory
- C. MO theory
- D. Free electron theory

Answer: C



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5. Half - life of polonium is of

- A. 138 days
- B. 56 days
- C. 13.8 days
- D. 110 days

Answer: C



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6. Galena is a sulphide of

A. Zn

B. Cu

C. Pb

D. None of these

Answer: C



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7. In the Kipp's apparatus, the reaction gets stopped on closing the outlet because

A. Gas starts coming out from top

B. The contact between sulphide and the acid is broken by the presence of gas collected in the free surface of the middle chamber

C. The acid becomes weak

D. A protective film is formed on iron sulphide

Answer: B



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8. The elements of group-16 which show negative oxidation state are

1) Oxygen 2) Polonium 3) Tellurium 4) Selenium

A. 1, 2 and 3

B. 2, 3 and 4

C. 1, 3 and 4

D. 1, 2, 3 and 4

Answer: C



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9. On adding Na_2S to sodium nitro prusside solution

A. $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$ complex is formed

B. $[\text{Fe}(\text{CN})_5\text{NOS}]^{-4}$ complex is formed

C. a violet colour is formed

D. All of the above

Answer: D



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10. What is the correct relation ship between the pH values of isomolar solution of $\text{Na}_2\text{O}(\text{pH}_1)$, $\text{Na}_2\text{S}(\text{pH}_2)$, $\text{Na}_2\text{Se}(\text{pH}_3)$ and $\text{Na}_2\text{Te}(\text{pH}_4)$?

A. $\text{pH}_1 < \text{pH}_2 < \text{pH}_3 < \text{pH}_4$

B. $\text{pH}_1 > \text{pH}_2 > \text{pH}_3 > \text{pH}_4$

C. $\text{pH}_1 < \text{pH}_2 < \text{pH}_3 = \text{pH}_4$

D. $\text{pH}_1 > \text{pH}_2 = \text{pH}_3 > \text{pH}_4$

Answer: B



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11. H_2S on incomplete combustion with oxygen forms mainly

A. H_2 and S

B. H_2 and SO_3

C. H_2O

D. S

Answer: C::D



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12. Which occur(s) free in nature?

A. I_2

B. S

C. P

D. O

Answer: A::B::C::D



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13. In $SOCl_2$ and SO_2Cl_2

A. The oxidation state of sulphur is different

B. The hybridisation state of sulphur is same

C. The shapes of both $SOCl_2$ and SO_2Cl_2 are same

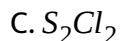
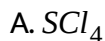
D. The Cl-S-Cl angle in both $SOCl_2$ and SO_2Cl_2 is same

Answer: A::B



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14. Which halide of sulphur undergoes disproportionation in water?



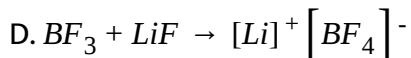
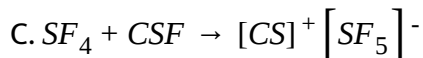
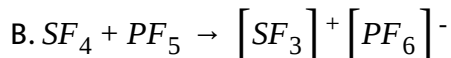
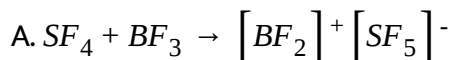
D. All the above

Answer: B::C



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15. Which of the following statements are correct?



Answer: B::C::D



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16. The correct statement about sulphur hexa fluoride

- A. There are 12 F-S-F 90° bond angle
- B. S in SF_6 has an expanded octet
- C. With H_2O , SF_6 can accept lone pair of electron in the empty 3d atomic orbital and gets hydrolysed
- D. SF_6 has a distorted octahedral geometry

Answer: A::B



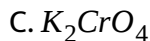
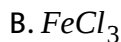
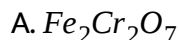
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PRACTICE SHEET - 1 (Linked Comprehension type questions)

1. Passage - I :

A yellow powder 'x' is burnt in a steam of Fluorine to obtain a colourless gas 'y' which is thermally stable and chemically inert its molecule has octahedral geometry another colourless gas 'z' with same constituent atoms as that of 'y' is obtained when sulphur dichloride is heated with sodium fluoride. It's molecule has trigonal bi-pyramidal geometry

The yellow powder 'x' is



Answer: D

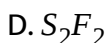


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2. Passage - I :

A yellow powder 'x' is burnt in a steam of Fluorine to obtain a colourless gas 'y' which is thermally stable and chemically inert its molecule has octahedral geometry another colourless gas 'z' with same constituent atoms as that of 'y' is obtained when sulphur dichloride is heated with sodium fluoride. It's molecule has trigonal bi-pyramidal geometry

The colourless gas 'y' is



Answer: B

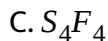


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3. Passage - I :

A yellow powder 'x' is burnt in a steam of Fluorine to obtain a colourless gas 'y' which is thermally stable and chemically inert its molecule has octahedral geometry another colourless gas 'z' with same constituent atoms as that of 'y' is obtained when sulphur dichloride is heated with sodium fluoride. It's molecule has trigonal bi-pyramidal geometry

The colourless gas 'z' is



Answer: A



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4. Passage - II :

Sulphur forms hexahalides, tetrahalides, dihalides and monohalides, sulphur forms only hexa fluorides but not hexachlorides, hexa bromides and hexaiodides. Sulphur halides tend to hydrolyse easily. Sulphur hexa fluorides is an exception.

Of the oxohalides, the most important are those of sulphur especially sulphur dichloride oxide (Thionyl chloride) $SOCl_2$ and sulphurdichloride dioxide (Sulphuryl chloride) SO_2Cl_2 these are also hydrolyse in water

SF_6 do not hydrolyse water because

- A. Due to strong S-F bonds which cannot be broken easily
- B. Because of steric hinderance of six fluorine atoms surrounding sulphur H_2O molecules can not approach sulphur
- C. Due to double bond character of 'S-F' bonds because of back bonding
- D. All the above

Answer: B



5. Passage - II :

Sulphur forms hexahalides, tetrahalides, dihalides and monohalides, sulphur forms only hexa fluorides but not hexachlorides, hexa bromides and hexaiodides. Sulphur halides tend to hydrolyse easily. Sulphur hexa fluorides is an exception.

Of the oxohalides, the most important are those of sulphur especially sulphur dichloride oxide (Thionyl chloride) $SOCl_2$ and sulphurdichloride dioxide (Sulphuryl chloride) SO_2Cl_2 these are also hydrolyse in water

$SOCl_2$ is dissolved in water which of the following statement is wrong about the solution

- A. The solution will give white ppt with baryta water soluble in dil.HCl
- B. The solution turns the lead acetate paper to black
- C. The solution turns orange dichromate to green
- D. The solution is acidic in nature

Answer: B



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6. Passage - II :

Sulphur forms hexahalides, tetrahalides, dihalides and monohalides, sulphur forms only hexa fluorides but not hexachlorides, hexa bromides and hexaiodides. Sulphur halides tend to hydrolyse easily. Sulphur hexa fluorides is an exception.

Of the oxahalides, the most important are those of sulphur especially sulphur dichloride oxide (Thionyl chloride) $SOCl_2$ and sulphurdichloride dioxide (Sulphuryl chloride) SO_2Cl_2 these are also hydrolyse in water

SO_2Cl_2 is dissolved in H_2O which of the following statement is wrong about the solution

A. Gives white ppt with $BaCl_2$ in soluble in any acid

B. The solution contain two different type of acids a monobasic and dibasic acid

- C. The solution can decolourize the permanganate
- D. The oxidation states of the elements in SO_2Cl_2 do not change when dissolve in water

Answer: C



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PRACTICE SHEET - 1 (Match the following questions)

COLUMN-I COLUMN-II

- | | |
|---------------|--------------------------------------|
| (A) S_2Cl_2 | (p) gives mustard gas with C_2H_4 |
| 1. (B) SF_6 | (q) gives dibasic acid on hydrolysis |
| (C) SCl_4 | (r) uniform bond angles |
| (D) SCl_2 | (s) Disproportionates on hydrolysis |



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2. Match List-I with List-II and select the correct answer using the codes given below the lists.

COLUMN-I

(A)Engle's sulphur

(B)Sulphur

(C)Rhombic sulphur

(D)monoclinic sulphur

COLUMN-II

(p)Rings, Chair conformation, unstable

(q)Fibrous or rubber like

(r)Crystalline form yellow crystals

(s)Puckered S_8 rings crown conformation



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PRACTICE SHEET - 1 (Integer answer type Questions)

1. Green vitriol is a hydrated salt with formula $FeSO_4 \cdot xH_2O$. What is the value of x



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2. In a double sulphate salt $K_2SO_4Al_2(SO_4)_3 \cdot xH_2O$. The value of x is



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3. How many $d\pi - p\pi$ bonds are present in $\gamma - \text{SO}_3$?



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4. The no. of radioactive elements in VI group is ____



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5. The total no. of oxidation states of sulphur (only magnitude) in S_8 , SF_2 , H_2S is



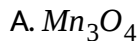
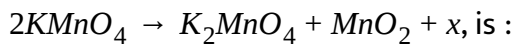
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6. Ordinary oxygen contain how many isotopes of oxygen ?



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1. The product x in the following equation :



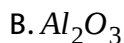
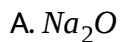
D. All

Answer: B



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2. The oxide which on strong heating evolves oxygen is :



C. CaO

D. BaO_2

Answer: D



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3. Non-metals combine with oxygen to form usually

A. basic oxides

B. neutral oxides

C. acidic oxides

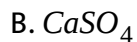
D. amphoteric oxides

Answer: C



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4. A black sulphide when treated with ozone becomes white. The white compound is :

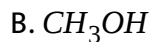
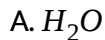


Answer: D



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5. Ozone readily dissolves in :



C. turpentine oil

D. ammonia

Answer: C



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6. Oxygen does not react with :

A. Cl

B. S

C. Na

D. P

Answer: D



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7. Ozone turns benzidine paper :

A. violet

B. brown

C. blue

D. red

Answer: B



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8. The number of S-S bonds in sulphur trioxide trimer S_3O_9 is

A. three

B. two

C. one

D. zero

Answer: D



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9. When SO_2 is passed through cupric chloride solution :

- A. the solution becomes colourless and a white ppt. of CuCl_2 is obtained
- B. a white ppt. is obtained
- C. the solution becomes colourless
- D. no visible change take place

Answer: C



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10. Oxygen is ozonised until the partial pressures of both gases are same.

What percentage of oxygen is ozonised?

- A. 40 %
- B. 60 %
- C. 50 %

D. 25 %

Answer: B



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11. At $T(K)$, 100 L of dry oxygen is present in a sealed container. It is subjected to silent electrical discharge till the volumes of oxygen and ozone become equal. What is the volume (in L) of ozone formed at $T(K)$?

A. 50

B. 60

C. 30

D. 40

Answer: D



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12. In the bleaching action of SO_2 _____

- A. SO_2 is reduced
- B. SO_2 is oxidised into H_2SO_4
- C. H_2S is formed
- D. coloured matter is reduced

Answer: B::D



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13. Which of the following does not have $P\pi - d\pi$ bonding

- A. NO_3^-
- B. SO_3^{2-}
- C. BO_3^{3-}
- D. CO_3^{2-}

Answer: A::C::D



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14. In γ -form of SO_3 , the hybridisation of sulphur is

A. sp

B. sp^3d

C. sp^2

D. sp^3

Answer: A::B::C



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15. The sulphur oxide SO_2 , can acts as

A. Reducing agent

B. oxidising agent

C. bleaching agent

D. Lewi's base

Answer: A::B::C::D



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16. sp^2 - Hybridisation is involved in the molecule of

A. CO

B. CO_2

C. SO_2

D. SO_3

Answer: C::D



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1. Passage-I :

When a gas 'A' is passed through dry KOH at low temperature a deep red coloured compound, B and a gas 'C' are obtained. The gas A, on reaction with but -2-ene, followed by treatment with Zn/H_2O yields acetaldehyde.

Identify A, B & C.

What is A



Answer: B

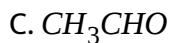
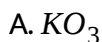


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2. Passage-I :

When a gas 'A' is passed through dry KOH at low temperature a deep red coloured compound, B and a gas 'C' are obtained. The gas A, on reaction with but -2-ene, followed by treatment with Zn/H_2O yields acetaldehyde. Identify A, B & C.

What is deep red coloured compound



D. None of these

Answer: A



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3. Passage-I :

When a gas 'A' is passed through dry KOH at low temperature a deep red

coloured compound, B and a gas 'C' are obtained. The gas A, on reaction with but -2-ene, followed by treatment with Zn/H_2O yields acetaldehyde. Identify A, B & C.

What is A

A. SO_2

B. O_2

C. H_2S

D. O_3

Answer: B



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4. Passage - II :

The solid(A) is a laboratory reagent. Give the following reactions.

- i) On strongly heating it gives two oxides of sulphur
- ii) On adding aqueous NaOH solution to its aqueous solution a dirty green precipitate is obtained, which starts turning brown on exposure to

air.

The solid A is



D. None of these

Answer: B



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5. Passage - II :

The solid(A) is a laboratory reagent. Give the following reactions.

- i) On strongly heating it gives two oxides of sulphur
- ii) On adding aqueous NaOH solution to its aqueous solution a dirty green precipitate is obtained, which starts turning brown on exposure to air.

What is compound in dirty green ppt.

A. $\text{Ca}(\text{OH})_2$

B. $\text{Fe}(\text{OH})_2$

C. $\text{Fe}(\text{OH})_3$

D. None of these

Answer: C



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6. Passage - II :

The solid(A) is a laboratory reagent. Give the following reactions.

i) On strongly heating it gives two oxides of sulphur

ii) On adding aqueous NaOH solution to its aqueous solution a dirty green precipitate is obtained, which starts turning brown on exposure to air.

The two oxides of sulphur are

A. SO_2 , SO_3

B. SO , SO_2

C. SO , SO_3

D. S_2O , S_2O_3

Answer: A



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PRACTICE SHEET - 2 (Match the following questions)

COLUMN-I COLUMN-II

(Compound) (Use)

(A) SO_2 (p) Antichlor

1. (B) Hypo (q) reducing agent

(C) Ozone (r) Purification of water

(D) H_2SO_4 (s) Dehydrating agent



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COLUMN-I COLUMN-II

(A) SO_2 (p) Acidic nature

2. (B) SO_3 (q) Oxidising agent

(C) O_3 (r) Reducing agent

(D) O_2^{-2} (s) Bleaching agent

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PRACTICE SHEET - 2 (Integer answer type Questions)

1. The oxidation of naphthalene in presence of catalyst Hg/H_2SO_4 to Phthalic acid. How many moles of SO_2 is formed ? (CO_2 evolved)

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2. Ozone reacts with dry Iodine to form an oxide having _____ Oxygen atoms in its molecule.

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3. The bond order in O_2^{2-} species is



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4. Cyclic trimer structure of SO_3 contains _____ no. of "S = O" bonds



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5. Oxygen is a gas while others are solids and S, Se, Te exist as staggered rings in normal condition. How many number of atoms are present in one ring



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6. Ozone reacts with dry iodine to form an oxide having _____ Oxygen atoms in its molecule.



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PRACTICE SHEET - 3 (Single or more than one option questions)

1. 100 gms of 118 % oleum reacted with excess water. How much H_2SO_4 is formed?

- A. 90 gm
- B. 118 gm
- C. 48 gm
- D. 100 gm

Answer: B



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2. Mark the compound which gives carbon with conc. H_2SO_4 :

- A. formic acid

B. succinic acid

C. oxalic acid

D. sugar

Answer: D



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3. The molecule of SO_2 is

A. Planar

B. Pyramidal

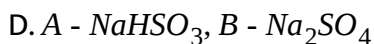
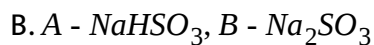
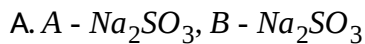
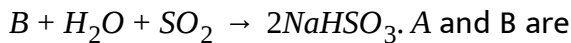
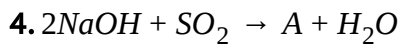
C. Angular

D. None of these

Answer: C



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Answer: A



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5. The behaviour of sulphur while reacting with water and alkali is similar to that of



D. CO_2

Answer: D



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6. On passing SO_2 gas through an acidified solution of $\text{K}_2\text{Cr}_2\text{O}_7$

A. The Solution gets decolourised

B. The solution becomes blue

C. SO_2 is reduced

D. Green $\text{Cr}_2(\text{SO}_4)_3$ is obtained

Answer: D



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7. Which of the following can convert acidified $Cr_2O_7^{2(-)}$ to green product?

A. SO_2 , H_2SO_3 and H_2SO_4

B. SO_3 , H_2S and H_2SO_3

C. SO_3 , H_2S and Fe^{+3}

D. SO_3^{-2} , H_2S and Fe^{+2}

Answer: B



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8. Which of the following statements are correct for SO_3 gas?

I) It acts as a bleaching agent in moist conditions

II) Its molecule has linear geometry

III) Its dilute solution is used as a disinfectant

IV) It can be prepared by the reaction of dilute H_2SO_4 with metal sulphide

A. I and III

B. II and IV

C. I and IV

D. II and III

Answer: A



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9. 1) M.P. of Rhombic sulphur is higher than that of monoclinic sulphur

2) Specific gravity of Rhombic sulphur is lower than that of Rhombic sulphur.

Then incorrect statement(s) are

A. Only 1

B. Only 2

C. Both 1 and 2

D. Neither 1 nor 2

Answer: C



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10. Consider the following bond angles $\alpha = O - O - O$ in ozone, $\beta = P - P - P$ in P_4 (white), $\gamma = N - N - N$ in azide anion (N_3^-), $\delta = C - C - C$ in diamond, then

A. $\alpha + \beta = \gamma$

B. $\beta + \delta > \gamma$

C. $\frac{\delta}{\beta} > \frac{\gamma}{\delta}$

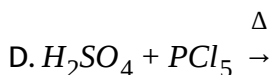
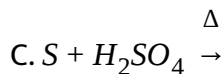
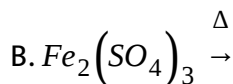
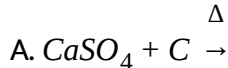
D. $\gamma - \alpha = \alpha - \beta$

Answer: C



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11. Sulphur trioxide can be obtained by which of the following reaction ?

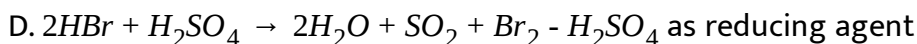
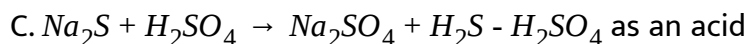
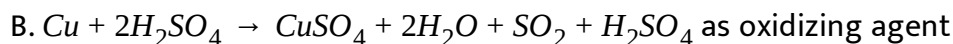
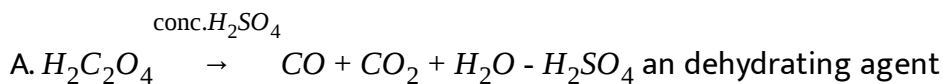


Answer: B



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12. Which of the following shows wrong matching

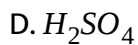
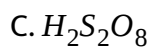
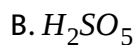
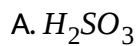


Answer: D



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13. Which among the following are peroxo acid of sulphur?

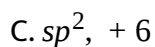
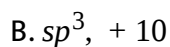
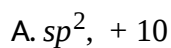


Answer: B::C



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14. Oxidation number of sulphur in caro's acid

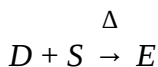
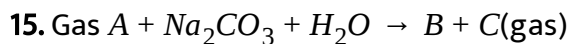


D. sp^3 , + 6

Answer: D



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Which of the following are correct?

A. A is SO_2

B. D is Na_2SO_3

C. C is CO_2

D. E is $Na_2S_2O_3$

Answer: A::B::C



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16. Which of the following statements regarding thiosulphate ion is/are correct?

- A. Shape of thiosulphate ion is tetrahedral
- B. The two sulphur atoms in thiosulphate ion are equivalent
- C. There is S-S bond in thiosulphate ion
- D. With I_2 thiosulphate ion gives tetrathionate ion

Answer: A::C::D



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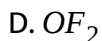
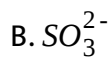
PRACTICE SHEET - 3 (Linked Comprehension type questions)

1. Passage - I :

$X + H_2SO_4 \rightarrow Y$, a colourless gas with irritating smell.

$y + K_2Cr_2O_7 + H_2SO_4 \rightarrow$ green solution.

What is X?



Answer: B



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2. Passage - I :

$X + H_2SO_4 \rightarrow Y$, a colourless gas with irritating smell.

$y + K_2Cr_2O_7 + H_2SO_4 \rightarrow$ green solution.

What is Y?



Answer: A



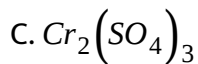
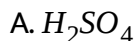
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3. Passage - I :

$X + H_2SO_4 \rightarrow Y$, a colourless gas with irritating smell.

$y + K_2Cr_2O_7 + H_2SO_4 \rightarrow$ green solution.

The compound present in green solution



D. None of these

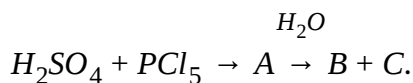
Answer: C



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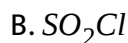
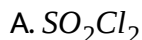
4. Passage - II :

Sulphuric acid is a substance of very great commercial importance as it is used practically in every important industry. This due to the chemical properties of sulphuric acid. This very reaction with metals & non-metals. It has properties of dehydration, oxidation, reduction and sulphonation etc. for example:



Where B & C are two strong acids.

The compound A is



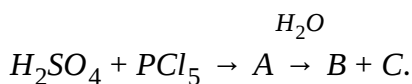
Answer: A



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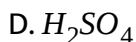
5. Passage - II :

Sulphuric acid is a substance of very great commercial importance as it is used practically in every important industry. This due to the chemical properties of sulphuric acid. This very reaction with metals & non-metals. It has properties of dehydration, oxidation, reduction and sulphonation etc. for example:



Where B & C are two strong acids.

The compound B is



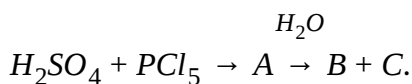
Answer: D



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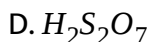
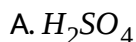
6. Passage - II :

Sulphuric acid is a substance of very great commercial importance as it is used practically in every important industry. This due to the chemical properties of sulphuric acid. This very reaction with metals & non-metals. It has properties of dehydration, oxidation, reduction and sulphonation etc. for example:



Where B & C are two strong acids.

The compound C is



Answer: B

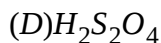
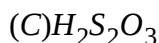
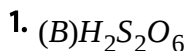
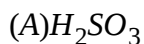


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PRACTICE SHEET - 3 (Match the following questions)

COLUMN-I

(Oxy-acid of S)



COLUMN-II

(Oxidation state of 'S')

(p) + 2

(q) + 3

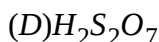
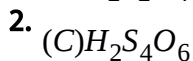
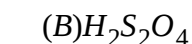
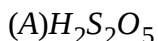
(r) + 4

(s) + 5



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COLUMN-I



COLUMN-II

(p) Dibasic

(q) S - O - S bond

(r) S - S bond with same oxidation state of sulphur

(s) S - S bond with different oxidation state of sulphur

(t) At least one 'S' in +6 oxidation state



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PRACTICE SHEET - 3 (Integer answer type Questions)

1. How many S-S bond are present in SO_3 trimer



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2. How many S-S bond are there in $S_2O_7^{2-}$



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3. How many S-S bond in polythionic acid having molecular formula $H_2S_5O_6$?



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4. The total no. of diprotic acids among the following is $H_3PO_4, H_2SO_4, H_3PO_3, H_2S_2O_7, H_3BO_3, H_3PO_2, H_2CrO_4, H_2SO_3, H_2CO_3$



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5. Number of hydroxyl groups present in pyrosulphuric acid is



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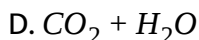
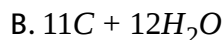
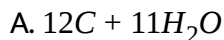
6. The formal charges on the three oxygen atoms in O_3 molecule are



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PRACTICE SHEET - 4 (Single or more than one option questions)

1. $C_{12}H_{22}O_{11} \xrightarrow{H_2SO_4}$ product, products of the reaction is /are





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2. H_2SO_4 is used in

- A. Petroleum refining
- B. manufacture of paints, pigments and dye stuff
- C. detergent industry
- D. all of the above are the uses of H_2SO_4



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3. An example of acid sulphate is

- A. $NaHSO_4$
- B. $CuSO_4$
- C. Na_2SO_4

D. None of the above



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4. On adding of conc. H_2SO_4 to a chloride salt colourless fumes are evolved but in case of iodide salt. Violet fumes come out. This is because

A. HI is of violet colour

B. HI gets oxidised to I_2

C. HI changes to HIO_3

D. H_2SO_4 reduces HI to I_2



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5. Hot conc. H_2SO_4 acts as moderately strong oxidising agent. It oxidises both metal and non-metals. Element which gets oxidised by conc. H_2SO_4

into two gaseous products is

A. Cu

B. Zn

C. S

D. C



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6. On treating PCl_5 with conc. H_2SO_4 , SO_2Cl_2 is formed as the final product this shows that H_2SO_4

A. is derivative of SO_2

B. is a monobasic acid

C. has great affinity for H_2O

D. has two hydroxyl groups in its structure



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7. H_2SO_4 is a

- 1) Dehydrating agent 2) Sulphonating agent
3) Reducing agent 4) Highly viscous liquid

Choose the correct set of choice from the options give below

A. 1, 2 & 3

B. 2, 3 and 4

C. 1, 3 and 4

D. 1, 2 and 4



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8. It is advised to add H_2SO_4 while preparing a standard solution of Mohr's salt to avoid

A. Hydration

B. Oxidation

C. Reduction

D. Hydrolysis



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9. H_2SO_4 has great affinity for water because

A. It hydrolysis the acid

B. It decomposes the acid

C. Acid decomposes water

D. Acid forms hydrates with water



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10. When conc. H_2SO_4 comes in contact with sugar, it becomes black due to

- A. Hydration
- B. Decolourisation
- C. Dehydration
- D. Hydrolysis



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11. Formic acid is a dibasic acid in nature: hence, it forms:

- A. CO
- B. CO_2
- C. C_3O_2
- D. SO_2



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12. Sulphuric acid is dibasic acid in nature: hence, it forms:

- A. Normal salt
- B. Acidic and basic salt
- C. Acidic salt
- D. Double salt



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13. The catalyst used in the manufacture of H_2SO_4 by contact process is

- A. Platinized asbestos
- B. CO

C. NO

D. V_2O_5



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14. Which of the following does not give hydrogen peroxide on hydrolysis?

A. $H_2S_2O_3$

B. H_2SO_5

C. $H_2S_2O_7$

D. $H_2S_4O_6$



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15. Select the correct statement about $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$?

- A. It is also called as hypo
- B. It is used in photography to form complex with AgBr
- C. It can be used as antichlor
- D. It is used to remove stains of I_2



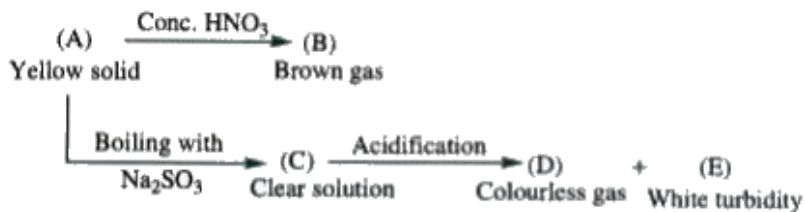
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16. The correct oxidation state of sulphur atoms in $\text{H}_2\text{S}_2\text{O}_3$ is / are

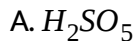
- A. +6, -2
- B. +4, -2
- C. +2, +4
- D. +5, -1

PRACTICE SHEET - 4 (Linked Comprehension type questions)

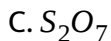
1. Passage - I :



Yellow solid 'A' is

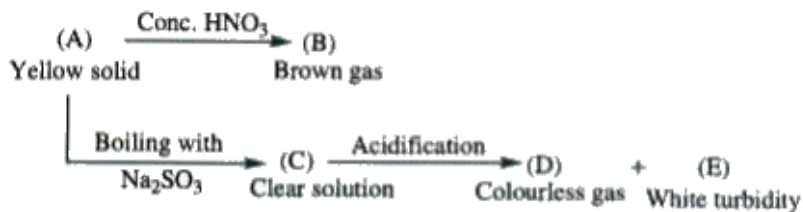


B. S

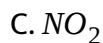


D. None of these

2. Passage - I :



Brown gas 'B' is

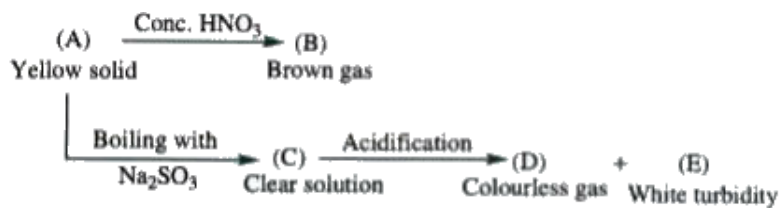


D. All of these

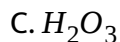
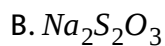
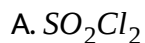


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3. Passage - I :



Solution 'C' is

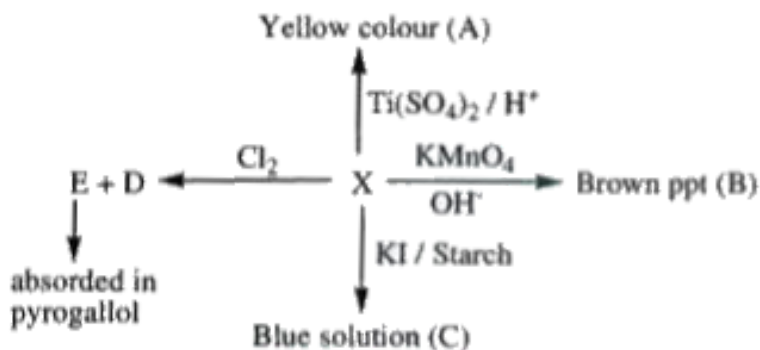


D. None of these



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4. Passage - II :



The oxidation state of 'Mn' in 'B' is

A. 0

B. +2

C. +4

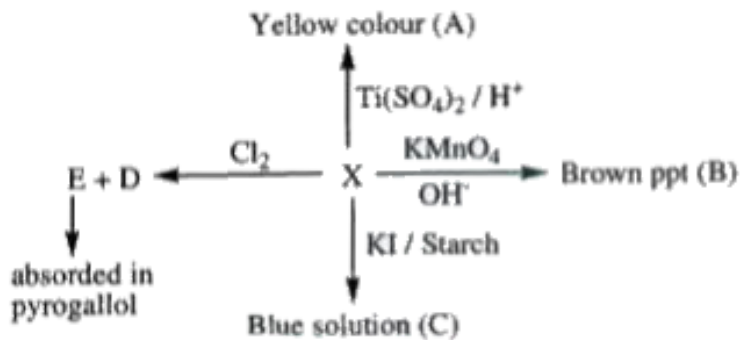
D. +6

Answer: B



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5. Passage - II :



During its reaction with Cl_2 , 'X' acts as

A. Oxidant

B. Reductant

C. Acid

D. Base

Answer: B



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6. Blue colour of 'C' is due to the formation of

A. Mn^{+2}

B. CrO_5

C. I_2

D. H_2TiO_4



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1. $\text{Na}_2\text{S}_2\text{O}_3$ may react with the compound given in Column-I, $\text{Na}_2\text{S}_2\text{O}_3$ exhibits the properties of the type give in the coloumn-II, matter the reactants given in column-I with the type of property, properties given in Column-II

COLUMN-I	COLUMN-II
(Reactant)	(Type of property)
(A) Cl_2	(p)Complexing agent
(B) AgBr	(q)Disproportionation
(C) HCl	(r)Only as reductant
(D) I_2	(s)An antichlor



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2. $\text{Na}_2\text{S}_2\text{O}_3$ may react with the compound given in Column-I, $\text{Na}_2\text{S}_2\text{O}_3$ exhibits the properties of the type give in the coloumn-II, matter the reactants given in column-I with the type of property, properties given in Column-II

COLUMN-I	COLUMN-II
(A) SO_2	(p)turns acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution green
(B) CO_2	(q)turns blue is Red
(C) H_2S	(r)turns lime water milky
(D) H_2O_2	(s)used for restoring old paintings in the museums



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PRACTICE SHEET - 4 (Integer answer type Questions)

1. Sulphuric acid acts as a powerful dehydrating agent. How many no of carbons are formed when glucose molecule is dehydrated by H_2SO_4 as reagent



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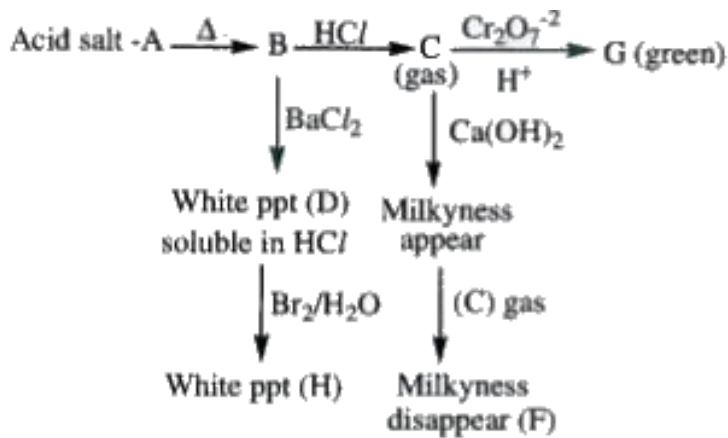
2. One molecule of H_2SO_4 forms how many no of series of salt's



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PRACTICE SHEET - 5 (Linked Comprehension type questions)

1. Passage-II:



'C' is

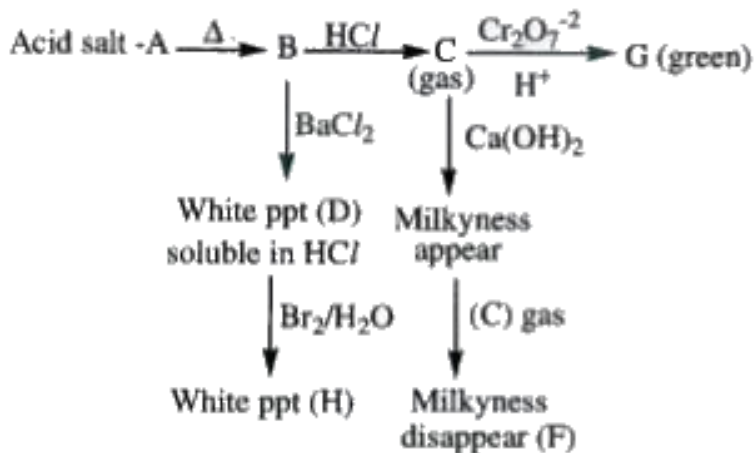
- A. CO_2
- B. SO_2
- C. Cl_2
- D. H_2S

Answer: B



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2. Passage-II:



'D' is

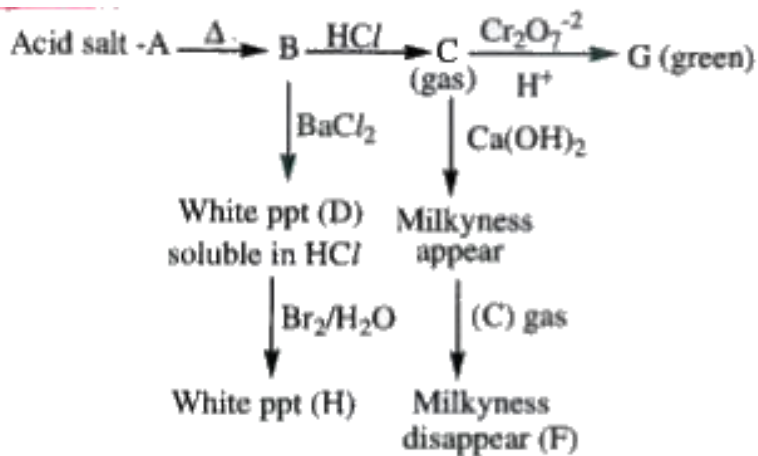
- A. $BaSO_4$
- B. $BaSO_3$
- C. $BaCO_{30}$
- D. $Ba_3(PO_4)_2$

Answer: B



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3. Passage-II:



'G' is

- A. CrO_4^{-2}
- B. Cr^{+3}
- C. CrO_5
- D. CrO_3

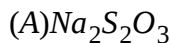
Answer: B



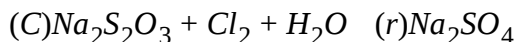
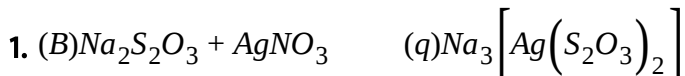
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PRACTICE SHEET - 5 (Match the following questions)

COLUMN-I



COLUMN-II



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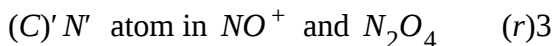
COLUMN-I

(Elements)



COLUMN-II

(Covalency)



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PRACTICE SHEET - 5 (Integer answer type Questions)

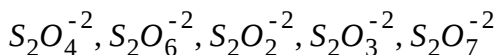
1. When This sulphate ion is oxidized by iodine, new product 'X' is formed.

The number of s-s linkage is/are present in 'X'?



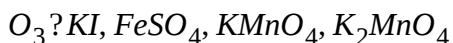
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2. Find the the number of ions having S-S bond from the following



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3. How many of the following is not oxidised by



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4. The difference in the oxidation state of the two types of 'S' atoms in



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5. The oxidation state of the product when 'KBr' and ' $KBrO_3$ ' react in acidic medium is

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6. When F_2 react with H_2S a product (x) of sulphur is formed the difference in the oxidation state of sulphur in H_2S and the in the product (x) is

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