



CHEMISTRY

BOOKS - DISHA PUBLICATION CHEMISTRY (HINGLISH)

HYDROGEN

Jee Main 5 Years At A Glance

1. limiting compositions of f - block hydrides are

- A. $(H_2O + O_2)$ and H_2O
- B. $(H_2O + O_2)$ and $(H_2O + OH^-)$
- C. H_2O and $(H_2O + O_2)$
- D. H_2O and $(H_2O + OH^-)$

Answer: C



2. Identify the incorrect statement regarding heavy water :

- A. It reacts with SO_3 to form deuterated sulphuric acid (D_2SO_4),
- B. It is used as a coolant in nuclear reactors.
- C. It reacts with CaC_2 to produce C_2D_2 and $Ca(OD)_2$.
- D. It reacts with Al_4C_3 to produce CD_4 and $Al(OD)_3$.

Answer: B



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3. Which one of the following statements about water is FALSE ?

- A. There is extensive intramolecular hydrogen bonding in the condensed phase.
- B. Ice formed by heavy water sinks in normal water.

C. Water is oxidized to oxygen during photosynthesis.

D. Water can act both as an acid and as a base.

Answer: A

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4. Permanent hardness in water cannot be cured by :

A. Treatment with washing soda

B. Boiling

C. Calgon's method

D. Ion exchange method

Answer: B

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5. Which physical property of dihydrogen is wrong?

- A. Odourless gas
- B. Tasteless gas
- C. Colourless gas
- D. Non - inflammable gas

Answer: D



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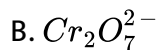
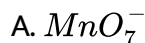
6. From the following statements regarding H_2O_2 , choose the incorrect statements:

- A. It has to be stored in plastic or wax lined glass bottles in dark.
- B. It has to be kept away from dust.
- C. It can act only as an oxidizing agent.
- D. It decomposes on exposure of light.

Answer: C

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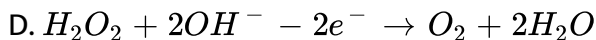
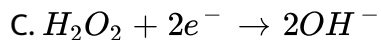
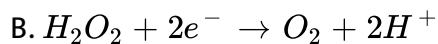
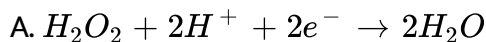
7. Hydrogen peroxide acts both as an oxidising and as a reducing agent depending upon the nature of the reacting species. In which of the following cases H_2O_2 acts as a reducing agent in acid medium ?



Answer: A

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8. In which of the following reactions H_2O_2 acts as a reducing agent ?



Answer: D

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Exercise 1 Concept Builder Topicwise Topic 1 Preparation Properties Of Hydrogen And Hydrides

1. Which one of the following is not an isotope of hydrogen ?

A. Deuterium

B. Tritium

C. Ortho hydrogen

D. None of these

Answer: C



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2. The ionisation of hydrogen atom would give rise to

- A. hydride ion
- B. hydronium ion
- C. proton
- D. hydroxyl ion

Answer: C



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3. Which of the following evolve hydrogen on reacting with cold dilute nitric acid ?

A. Iron and H_2SO_4 (aqueous)

B. Iron and steam

C. Copper and HCl (aqueous)

D. Sodium and ethyl alcohol

Answer: C

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4. Which of the following evolve hydrogen on reacting with cold dilute nitric acid ?

A. Mg

B. Al

C. Fe

D. Cu

Answer: A

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5. Hydrogen can behave as a metal

- A. at very high temperature
- B. at very low temperature
- C. at very high pressure
- D. at very low pressure

Answer: C

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6. Out of the two allotropic forms of dihydrogen, the form with lesser molecular energy is

- A. ortho
- B. meta

C. para

D. all have same energy

Answer: C

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7. The property of hydrogen which distinguishes it from alkali metals is

A. its electropositive character.

B. its affinity for non metal

C. its reducing character.

D. its non - metallic character.

Answer: D

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8. Hydrogen accepts an electron to form inert gas configuration. In this it resembles

- A. halogen
- B. alkali metals
- C. chalcogens
- D. alkaline earth metals

Answer: A



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9. Hydrogen bond energy is equal to

- A. 3 - 7 cal
- B. 30 - 70 cal
- C. 3 - 10 kcal
- D. 30 - 70 kcal

Answer: C

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10. Which of the following ions can be replaced by H^+ ions when H_2 gas is bubbled through the solutions containing these ions?



Answer: C

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11. Saline hydrides react explosively with water, such fires can be extinguished by

A. water

B. carbon dioxide

C. sand

D. none of these

Answer: C



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12. When the same amount of zinc is treated separately with excess of sulphuric acid and excess of sodium hydroxide, the ratio of volume of hydrogen evolved is

A. 1 : 1

B. 1 : 2

C. 2 : 1

D. 9 : 4

Answer: A

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13. Ortho and para hydrogen differ in

- A. in the number of protons
- B. in the molecular mass
- C. in the nature of spins of protons
- D. in the nature of spins of electrons

Answer: C

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14. Which of the following cannot displace hydrogen from steam ?

- A. Ba

B. Pb

C. Hg

D. Sn

Answer: C



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15. Which hydride is an ionic hydride?

A. H_2S

B. TiH_4

C. NH_3

D. NaH

Answer: D



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Exercise 1 Concept Builder Topicwise Topic 2 Preparation And Properties Of Water

1. The reagent commonly used to determine hardness of water titrimetrically is :

- A. oxalic acid
- B. sodium thiosulphate
- C. sodium citrate
- D. disodium salt of EDTA

Answer: D

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2. Which of the following groups of ions makes the water hard ?

- A. Sodium and bicarbonate
- B. Magnesium and chloride

C. Potassium and sulphate

D. Ammonium and chloride

Answer: B

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3. The $H - O - H$ angle in water molecule is about

A. 90°

B. 180°

C. 102.5°

D. 104.5°

Answer: D

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4. When zeolite (hydrated sodium aluminium silicate) is treated with hard water the sodium ions are exchanged with

A. H^+ ion

B. Ca^{2+} ions

C. SO_4^{2-} ions

D. OH^- ions

Answer: D



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5. The alum used for purifying water is

A. ferric alum

B. chrome alum

C. potash alum

D. ammonium alum

Answer: C



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6. The boiling point of water is exceptionally high because

- A. there is covalent bond between H and O.
- B. water molecular is linear.
- C. water molecules associate due to hydrogen bonding.
- D. water molecule is not linear.

Answer: C



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7. Water possesses a high dielectric constant, therefore

- A. it always contains ions.

B. it is a universal solvent.

C. can dissolve covalent compounds.

D. can conduct electricity.

Answer: B

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8. Triple point of water is

A. 273K

B. 373K

C. 203K

D. 193K

Answer: A

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9. Whichh of the following is correct about heavy water ?

- A. Water at $4^{\circ}C$ having maximum density is known as heavy water.
- B. It is heavier than water (H_2O)
- C. It is formed by the combination of heavier isotope of hydrogen with oxygen.
- D. None of these

Answer: C



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10. The low density of ice compared to water is due to

- A. hydrogen - bonding interactions.
- B. dipole - dipole interactions.
- C. dipole - induced dipole intractions.

D. induced dipole - induced dipole interactions.

Answer: A

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11. At its melting point ice is lighter than water because

- A. H_2O molecules are more closely packed in solid state.
- B. ice crystals have hollow hexagonal arrangement of H_2O molecules.
- C. on melting of ice the H_2O molecules shrink in size.
- D. ice forms mostly heavy water on first melting.

Answer: B

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12. D_2O is preferred to H_2O , as a moderator, in nuclear reactors because

A. D_2O slows down fast neutrons better

B. D_2O has high specific heat

C. D_2O is cheaper

D. none of these

Answer: D

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13. Polyphosphates are used as water softening agents because they

A. form soluble complexes with anionic species

B. precipitate an ionic species.

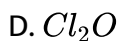
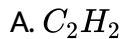
C. forms soluble complexes with cationic species.

D. precipitate cationic species.

Answer: C

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14. The shape of water molecule is same as that of



Answer: D



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15. Match list I with list II and select the correct answer using the codes given below the lists :

List I

1. Heavy water

2. Temporary hard water

3. Soft water

4. Permanent hard

List II

A. Bicarbonates of Mg and Ca in water

B. No foreign ions in water

C D_2O

D Sulphates and chlorides of water Mg and Ca i

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

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

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

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

Answer: D



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16. The maximum density of water is reached at a temperature

A. 273 K

B. 277 K

C. 373 K

D. none of above

Answer: B



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17. Ozone is used for purifying water because

- A. is paramagnetic
- B. absorbs harmful UV radiations
- C. destroys viruses and bacteria
- D. is reducing

Answer: C



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18. Water contracts on heating :

- A. to $100^{\circ}C$
- B. from $0^{\circ}C$ to $4^{\circ}C$
- C. to 2743 K

D. from $10^{\circ}C$ to $20^{\circ}C$

Answer: B

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Exercise 1 Concept Builder Topicwise Topic 3 Preparation And Properties Of Hydrogen Peroxide

1. The amount of H_2O_2 present in 1 L of $1 \cdot 5NH_2O_2$ solution is

A. 25.5 g

B. 3.0 g

C. 8.0 g

D. 2.5 g

Answer: A

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2. Decomposition of H_2O_2 is accelerated by

- A. glycerine
- B. alcohol
- C. phosphoric acid
- D. Pt powder

Answer: D



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3. The structure of H_2O_2 is

- A. planar
- B. non planar
- C. spherical
- D. linear

Answer: B

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4. In lab H_2O_2 is prepared by

- A. cold $H_2SO_4 + BaO_2$
- B. $HCl + BaO_2$
- C. conc. $H_2SO_4 + Na_2O_2$
- D. $H_2 + O_2$

Answer: A

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5. The reaction of $H_2S + H_2O_2 \rightarrow S + 2H_2O$ manifests

- A. acidic nature of H_2O_2

B. alkaline nature of H_2O_2

C. oxidising nature of H_2O_2

D. reducing action of H_2O_2

Answer: C

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6. Which substance does not speed up the decomposition of H_2O_2 ?

A. Glycerol

B. Pt

C. Gold

D. MnO_2

Answer: A

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7. H_2O_2 is :

- A. poor polar solvent than water
- B. better polar solvent than H_2O .
- C. both have equal polarity.
- D. better polar solvent but its strong auto - oxidising ability limits its use as such.

Answer: D



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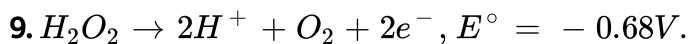
8. H_2O_2 is always stored in black bottles because

- A. it is highly unstable.
- B. its enthalpy of decomposition is high.
- C. it undergo auto - oxidation on prolonged standing.

D. none of these

Answer: C

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This equation represents which of the following behaviour of H_2O_2

A. Reducing

B. Oxidising

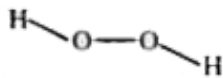
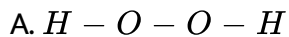
C. Acidic

D. Catalytic

Answer: A

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10. Which of the following is a true structure of H_2O_2 ?



B.



C.



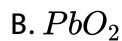
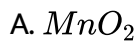
D.

Answer: B



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11. HCl is added to following oxides. Which one would give H_2O_2 ?



C. BaO

D. None of these

Answer: D

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12. 6 volume sample of H_2O_2

A. will contain 6 % V/V of H_2O_2 .

B. will contain 6 % W/V of H_2O_2 .

C. would give 6 volumes of oxygen per unit volume of H_2O_2 sample

STP.

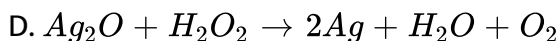
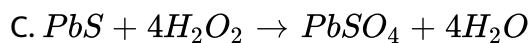
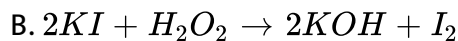
D. would give 6 volumes of oxygen per unit weight of H_2O_2 sample at

STP.

Answer: C

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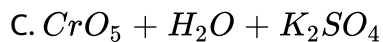
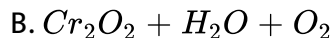
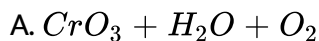
13. In which of the following reactions, H_2O_2 is acting as a reducing agent?

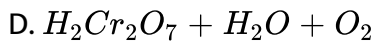


Answer: D

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14. Acidified solution of $K_2Cr_2O_7$ on treatment with H_2O_2 yields :





Answer: C

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15. Water can be tested by

A. smell

B. taste

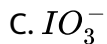
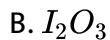
C. hydrated $CuSO_4$

D. anhydrous $CoCl_3$ (blue) which changes to pink

Answer: D

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16. Predict the product of reaction of I_2 with H_2O_2 in basic medium.



Answer: A

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17. Hydrogen peroxide does not

A. liberate iodide from KI

B. turn titanium salt yellow

C. gives silver peroxide with moist silver oxide

D. turn mixture of aniline, $KClO_3$ and dil. H_2SO_4 violet

Answer: C

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Exercise 2 Concept Applicator

1. Hydrogen at room temperature contains :

A. 25 % ortho + 75 % para

B. 25% para +75% ortho

C. 50% ortho +50% para

D. 60% ortho +34% para

Answer: B



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2. Limiting compositions of f - block hydrides are

A. MH_2 and MH_3

B. MH_3 and MH_5

C. MH_2 and MH_8

D. MH_2 and MH_6

Answer: A

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3. In Bosch's process, which gas is utilised for the production of hydrogen gas

A. Producer gas

B. Water gas

C. Coal gas

D. None of these

Answer: B

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4. Which of the following terms is not correct for hydrogen ?

A. Its molecules is diatomic.

B. It exists both as H^+ and H^- in different chemical compounds.

C. It is the only species which has on neutrons in the nucleus.

D. Heavy water is unstable because hydrogen is substituted by its isotope deuterium.

Answer: D



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5. Nascent hydrogen consists of

A. hydrogen atoms with excess of energy.

B. hydrogen molecules with excess of energy.

C. hydrogen ions in excited state.

D. solvated protons.

Answer: A



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6. Pick out the correct statement

- A. By decreasing the temperature pure para - hydrogen can be obtained.
- B. By increasing the temperature pure ortho - hydrogen can be obtained.
- C. By decreasing the temperature pure ortho - hydrogen can be obtained.
- D. By increasing the temperature pure para - hydrogen can be obtained.

Answer: A



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7. Tritium undergoes radioactive decay giving

A. α – particles

B. β – particles

C. neutrons

D. λ – rays

Answer: B



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8. 2g of aluminium is treated, separately with excess of dilute H_2SO_4 , and excess of $NaOH$, the ratio of volumes of hydrogen evolved is

A. 2 : 3

B. 1 : 1

C. 2 : 1

D. 1:2

Answer: B

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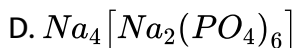
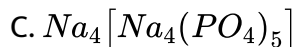
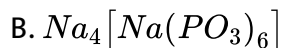
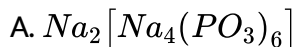
9. Metal hydrides are ionic, covalent or molecular in nature. Among LiH, NaH, KH, RbH, CsH the correct order of increasing ionic character is



Answer: B

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10. Calgon used as water softener is



Answer: A



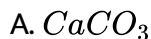
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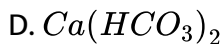
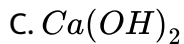
11. Chemical A is used for water softening to remove temporary hardness.

A reacts with sodium carbonate to generate caustic soda. When CO_2 is

bubbled through a solution of A, it turns cloudy. What is the chemical

formula of A ?





Answer: C

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12. Which of the following is not true?

A. D_2O freezes at lower temperature than H_2O

B. Reaction between H_2 and Cl_2 is much faster than D_2 and Cl_2 .

C. Ordinary water gets electrolysed more rapidly than D_2O .

D. Bond dissociation energy of D_2 is greater than H_2 .

Answer: A

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13. The volume strength of 1 · 5 N H_2O_2 solution is

A. 8.4

B. 8.0

C. 4.8

D. 3.0

Answer: A



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14. 20 volume H_2O_2 solution has a strength of about

A. 30 %

B. 6 %

C. 3 %

D. 10 %

Answer: B

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15. Which of the following is wrong about H_2O_2 ?

It is used

- A. as acerating agent in production of spong rubber.
- B. as an antichlor.
- C. for restoring white colour of blackened lead painting.
- D. none of these

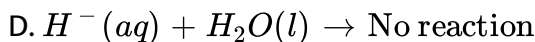
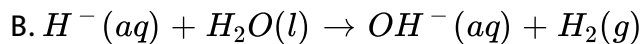
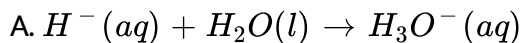
Answer: D

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16. The hydride ion H^- is a stronger base than its hydroxide ion OH^- .

Which of the following reactions will occurs if sodium hydride (NaH) is

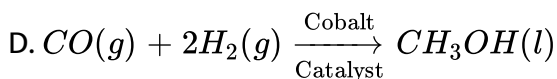
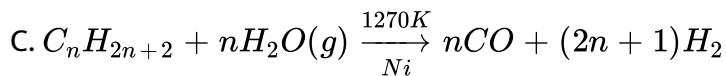
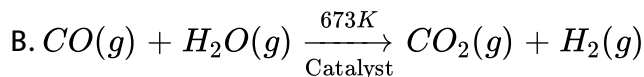
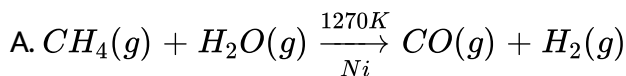
dissolved in water ?



Answer: B

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17. Which of the following reactions is an example of use of water gas in the synthesis of other compounds?

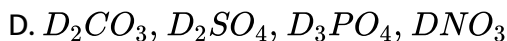
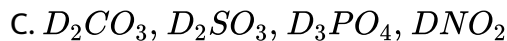
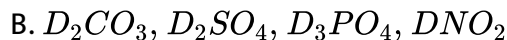
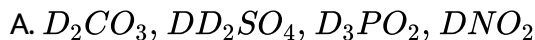


Answer: D



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18. Heavy water reacts respectively with CO_2 , SO_3 , P_2O_5 and N_2O_5 to give the compounds :



Answer: D



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19. Which of the following is formed by the action of water on sodium peroxide ?

A. H_2

B. N_2

C. O_2

D. CO_2

Answer: C

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20. The percentage by weight of hydrogen in H_2O_2 is

A. 5.88

B. 6.25

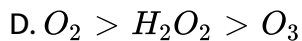
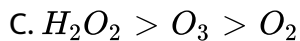
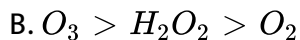
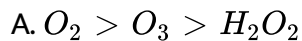
C. 25

D. 50

Answer: A

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21. The correct order of O - O bond length in $O_2H_2O_2$ and O_3 is



Answer: C



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22. Two ice cubes are pressed over each other until they unite to form one block. The force mainly responsible for holding them together is

A. Hydrogen bond formation

B. van der Waals forces

C. Covalent attraction

D. Ionic interaction

Answer: A



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23. The molarity of a 100 mL solution containing 5.1 g of hydrogen peroxide is

A. 0.15 M

B. 1.5 M

C. 3.0 M

D. 50.0 M

Answer: B



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24. When water is dropped over sodium peroxide, the colourless gas produced is

- A. dinitrogen
- B. dioxygen
- C. dihydrogen
- D. hydrogen peroxide

Answer: B



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25. 10L of hard water required 0.56g of lime (CaO) for removing hardness. Hence, temporary hardness in ppm (part per million 10^6) of $CaCO_3$ is:

- A. 100
- B. 200

C. 10

D. 20

Answer: B

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26. The adsorption of hydrogen by metals is called :

A. dehydrogenation

B. hydrogenation

C. occlusion

D. adsorption

Answer: C

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27. Which of the following statements is correct?

- A. Hydrogen has same IP as alkali metals.
- B. Hydrogen has same electronegativity as halogens.
- C. It has oxidation number of $-I$ and $+I$.
- D. It will not be liberated at anode.

Answer: C



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28. Which of the following statements do not define the characteristic property of water Water is a universal solvent ?

- A. It can dissolve maximum number of compounds.
- B. It has very low dielectric constant.
- C. It has high liquid range.
- D. None of these.

Answer: B

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29. The strength in volumes of a solution containing 30.36 g/L of H_2O_2 is

(Given volume of 1 mole of gas STP = 22.4 litre)

A. 10 V

B. 5 V

C. 20 V

D. None of these

Answer: A

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30. Acidified solution of $K_2Cr_2O_7$ on treatment with H_2O_2 yields :

A. blue solution

B. CrO_5

C. chromium peroxide

D. all of these

Answer: B



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