CHEMISTRY

BOOKS - MTG CHEMISTRY (ENGLISH)

THE P-BLOCK ELEMENTS

Mcqs

1. Fill in the blanks by choosing an appropriate option.

(i) "--------" is a synthetic radioactive element of group 15 having electronic configuration (ii) "----------"

A. (i) (ii)
$_{115}Mc$ $[Rn]5f^{14}6d^{10}7s^27p^3$

B. (i) (ii)
$_{115}Mc$ $[Xe]5f^{14}6d^{10}7s^27p^3$

C. (i) (ii)
$_{116}Lv$ $[Rn]5f^{14}6d^{10}7s^27p^4$

D. (i) (ii)

$_{114}Fl$ $[Rn]5f^{14}6d^{10}7s^27p^2$

Answer: A

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2. The oxidation state of nitrogen is highest in

A. N_3H

B. NH_3

C. NH_2OH

D. N_2H_4

Answer: A

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3. Which of the following shows nitrogen with its increasing order of oxidation number.

A. $N_2O < NO < NO_2 < NO_3^- < NH_4^+$

B. $NH_4^+ < N_2O < NO < NO_2 < NO_3^-$

C. $NH_4^+ < N_2O < NO_2 < NO_3^- < NO$

D. $NH_4^+ < NO < N_2O < NO_2 < NO_3^-$

Answer: B

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4. Nitrogen forms N_2 but phosphorous when forms P_2 gets readily converted into P_4 because

A. $p\pi - p\pi$ bonding is strong in phosphorus

B. $p\pi - p\pi$ bonding is weak in phosphorus

C. triple bond is present in phosphorus

D. single P - P bond is weaker than N -N bond.

Answer: B

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5. The decreasing order of boiling points of the following hydrides is

A. $SbH_3 > AsH_3 > PH_3 > NH_3$

B. $NH_3 > SbH_3 > AsH_3 > PH_3$

C. $SbH_3 > NH_3 > AsH_3 > PH_3$

D. $PH_3 > AsH_3 > SbH_3 > NH_3$

Answer: C

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6. Nitrogen can form only one chloride with chlorine which is NCl_3 whereas P can form PCl_3 and PCl_5. This is

A. due to absence of d-orbitals in nitrogen

B. due to difference in size of N and P

C. due to higher reactivity of P towards Cl than N

D. due to presence of multiple bonding in nitrogen.

Answer: A

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7. On heating a mixture of NH_4Cl and KNO_2, we get

A. NH_4NO_3

B. $KNH_4(NO_3)_2$

C. N_2

D. NO

Answer: C

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8. Nitrogen is relatively inactive element because

A. its atoms has a stable electronic configuration

B. it has low atomic radius

C. its electronegativity is fairly high

D. dissociation energy of its molecule is fairly high.

Answer: D

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9. Nitrogen comnines with metals to form

A. nitrites

B. nitrates

C. nitrosyl chloride

D. nitrides

Answer: D

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10. Nitrogen is used to fill electric bulbs because

A. it is lighter than air

B. it makes the bulb to glow

C. it does not support combustion

D. it is non-toxic.

Answer: C

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11. Which of the following compounds will not give ammonia on heating?

A. $(NH_4)_2SO_4$

B. NH_2CONH_2

C. NH_4NO_2

D. NH_4Cl

Answer: C

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12. Which of the following factors would favour the formation of ammonia?

A. High pressure

B. Low temperature

C. High volume

D. Low pressure

Answer: A

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13. Ammonia is a Lewis base. It forms complexes with cations. Which one of the following cations does not form complex with ammonia?

A. Ag^{+}

B. Cu^{2+}

C. Cd^{2+}

D. Pb^{2+}

Answer: D

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14. Ammonia is used in detection of Cu^{2+} ion because

A. 1. aqueous solution of NH_3 reacts with Cu^{2+} ion to form deep blue coloured complex

B. 2. NH_3 reacts with Cu^{2+} ion to give blue precipitate of CuO

C. 3. aqueous solution of NH_3 reacts with Cu^{2+} ion to form white coloured complex

D. 4. NH_3 reacts with Cu_{2+} ion to give green precipitate.

Answer: A

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15. Consider the following sequence of conversion.

$$\underbrace{2NO + O_2}_{(X)} \Leftrightarrow \underset{(Y)}{2NO_2} \overset{\text{cool}}{\underset{\text{heat}}{\Longleftrightarrow}} \underset{(Z)}{N_2O_4}$$

X, Y and Z can be described as

A. 1.

X	Y	Z
Colourless	Brown paramagnetic	Colourless diamagnetic

B. 2.

X	Y	Z
Brown	Colourless diamagnetic	Brown paramagnetic

C. 3.

X	Y	Z
Colourless	Colourless, paramagnetic	Brown diamagnetic

D. 4.

X	Y	Z
Brown	Brown paramagnetic	Brown diamagnetic

Answer: A

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16. Which oxide of nitrogen is obtained on heating ammonium nitrate at $250^\circ C$?

A. Nitric oxide

B. Nitrous oxide

C. Nitrogen dioxide

D. Dinitrogen tetraoxide

Answer: B

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17. Which of the following oxides is an anhydride of nitrous acid?

A. N_2O_3

B. NO_2

C. NO

D. N_2O_4

Answer: A

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18. A gas (X) is obtained when copper reacts with dilute HNO_3. The gas thus formed reacts with oxygen to give brown fumes of (Y). (Y) when dissolved in water gives an important acid (Z) and the gas (X). X, Y and Z respectively are

A. NO, NO_2, HNO_3

B. NO_2, NO, HNO_3

C. N_2O, NO, HNO_2

D. NO, N_2O, HNO_3

Answer: A

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19. Complete the given equations:

(i) $Cu + 8HNO_3 \rightarrow 3Cu(NO_3)_2 + \overset{W}{\ldots} + 4H_2O$

(ii) $4Zn + 10HNO_3 \rightarrow 4Zn(NO_3)_2 + 5H_2O + \overset{X}{\ldots}$

(iii) $l2 + 10HNO_3 \rightarrow \overset{Y}{\ldots} + 10NO_2 + 4H_2O$

A. W X Y
$2NO_2$ NO $5HIO_3$

B. W X Y
$2NO$ N_2O $2HIO_3$

C. W X Y
N_2 NO_2 HI

D. W X Y
N_2O NO_2 $3HI$

Answer: B

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20. Atomicity of phosphorus is

A. 1. one

B. 2. two

C. 3. three

D. 4. four

Answer: D

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21. The structure of white phosphorus is

A. square planar

B. pyramidal

C. tetrahedral

D. trigonal planar

Answer: C

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22. Each of the following is true for white and red phosphorus except that they

A. 1. are both soluble in CS_2

B. 2. can be oxidized by heating in air

C. 3. consist of the same kind of atoms

D. 4. can be converted into one another.

Answer: A

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23. When white phosphorus is heated at 473 K under high pressure, what will happen?

A. α-Black phosphorus is formed.

B. β-Black phosphorus is formed.

C. Red phosphorus is formed.

D. No change would be observed.

Answer: B

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24. Phosphine is prepared by the action of

A. 1. P and H_2SO_4

B. 2. P and $NaOH$

C. 3. P and H_2S

D. 4. P and HNO_3

Answer: B

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25. Fill in the blanks :

(i) $Ca_3P_2 + 6HCl \rightarrow 3CaCl_2 + ...p....$

(ii) $P_4 + 3NaOH + 3H_2O \rightarrow ...q... + 3NaH_2PO_2$

(iii) $PH_4I + KOH \rightarrow KI + H_2O + ...r...$ p, q and r respectively are

A. a. PH_3, H_3PO_3, Pl_3

B. b. PH_3, PH_3, PH_3

C. c. PCl_3, H_3PO_4, PH_3

D. d. PCl_5, PH_3, P_4O_6

Answer: B

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26. Holme's signal uses chemical compound

A. 1. calcium carbide

B. 2. calcium phosphide

C. 3. calcium carbide and calcium phosphide

D. 4. calcium carbide and aluminium carbide.

Answer: C

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27. A translucent white waxy solid (A) reacts with excess of chlorine to give a yellowish white powder (B). (B) reacts with organic compounds containing -OH group converting them into chloro derivatives. (B) on hydrolysis gives (C) and is finally converted to phosphoric acid. (A), (B) and (C) are

A. 1. P_4, PCl_3, H_3PO_4

B. 2. P_4, PCl_5, H_3PO_3

C. 3. P_4, PCl_5, $POCl_3$

D. 4. P_4, PCl_3, $POCl_3$

Answer: C

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28. Which of the following is not correctly matched?

A. $PCl_5 - sp^3d$ hybridisation

B. $PCl_3 - sp^3$ hybridisation

C. $PCl_5 \quad (\text{solid}) \quad - [PtCl_4]^+ [PtCl_6]^-$

D. PCl_5 - brownish powder

Answer: D

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29. On reaction with Cl_2, phosphorus forms two types of halides 'A' and 'B'. Halide 'A' is yellowish-white powder but halide 'B' is colourless oily liquid. What would be the hydrolysis products of 'A' and 'B' respectively?

A. H_3PO_4, H_3PO_3

B. $HOPO_3$, H_2PO_2

C. H_3PO_3, H_3PO_4

D. HPO_3, H_3PO_3

Answer: A

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30. Which of the following statements is not correct about the structure of PCl_5?

A. PCl_5 has a trigonal bipyramidal structure.

B. Three equatorial P-Cl bonds are equivalent.

C. The two axial bonds are different and longer than equatorial bonds.

D. Equatorial bond pairs suffer more repulsion than that of the axial bond pairs.

Answer: D

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31. Why all P - F bonds in PF_5 are not equivalent?

A. PF_5 has sp^3d hybridisation, out of five P-F bonds three are equatorial which have different lengths.

B. PF_5 has sp^3 hybridisation, out of five P-F bonds two are equatorial which have different lengths.

C. Out of five P-F bonds two are axial and three equatorial. All five bonds have different bond lengths.

D. PF_5 is made up of two types of bonds namely covalent and coordinate, hence are not equivalent.

Answer: A

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32. The number of $P-O-P$ bonds in cyclotrimetaphosphoric acid, $(HPO_3)_3$ is

A. Four

B. Three

C. Two

D. One

Answer: B

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33. Which of the following is a tetrabasic acid?

A. Hypophosphorous acid

B. Metaphosphoric acid

C. Pyrophosphoric acid

D. Orthophosphoric acid

Answer: C

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34. Phosphorous acid on heating gives the following products: $4H_3PO_3 \xrightarrow{\Delta} 3H_3PO_4 + PH_3$ The above reaction is an example of

A. oxidation

B. thermal decomposition

C. disproportionation

D. reduction

Answer: C

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35. Group 16 elements have lower value of first ionisation enthalpy as compared to group 15 elements because

A. half filled p-orbitals in group 15 elements are more stable

B. group 16 elements have smaller size than group 15 elements

C. group 16 elements contain double bond while group 15 elements have triple bond

D. group 16 elements have more number of electrons in p-orbitals.

Answer: A

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36. Covalency of oxygen cannot exceed 2 unlike sulphur which can show +4 or +6 because

A. oxygen atom does not have d-orbitals

B. oxygen atom has two unpaired electrons in its valence shell

C. oxygen can form a double bond with another oxygen atom

D. electrons of oxygen atom cannot be promoted to d-orbitals due to its small size.

Answer: A

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37. Arrange the following hydrides of group 16 elements in order of increasing stability.

A. $H_2S < H_2O < H_2Te > H_2Se$

B. $H_2O < H_2Te < H_2Se < H_2S$

C. $H_2O < H_2S < H_2Se < H_2Te$

D. $H_2Te < H_2Se < H_2S < H_2O$

Answer: D

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38. Name of the synthetic radioactive element of group 16 having atomic number 116 is

A. Livermorium

B. Tennessine

C. Livernorium

D. Moscovium

Answer: A

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39. On heating $KCIO_3$ we get :

A. $KClO_2 + O_2$

B. $KCI + O_2$

C. $KCl + O_3$

D. $KCl + O_2 + O_3$

Answer: B

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40. Select the correct option regarding the properties of dioxygen?

A. 1. Dioxygen never reacts with metals.

B. 2. Dioxygen is diamagnetic in nature.

C. 3. Combination of dioxygen with other elements is highly exothermic process.

D. 4. Dioxygen liquefies at 55 K and freezes at 90 K.

Answer: C

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41. Which of the following is not correctly matched?

A. Acidic oxides - P_2O_5, NO_2, Cl_2O_7

B. Basic oxides - Na_2O, CaO, MgO

C. Neutral oxides - CO_2, CO, BeO

D. Amphoteric oxides - ZnO, SnO, Al_2O_3

Answer: C

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42. The correct order of acidic strength is

A. $K_2O > CaO > MgO$

B. $CO_2 > N_2O_5 > SO_3$

C. $Na_2O > MgO > Al_2O_3$

D. $Cl_2O_7 > SO_2 > P_4O_{10}$

Answer: D

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43. Which of the following is the wrong statement?

A. Ozone is paramagnetic gas.

B. The two oxygen -oxygen bond length in ozone are identical.

C. O_3 molecule is bent.

D. Ozone is violet-black in solid state.

Answer: A

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44. Which one is not a property of ozone?

A. it acts as an oxidising agent in dry state.

B. oxidation of $KI \text{ into } KIO_2$.

C. PbS is oxidised to $PbSO_4$

D. Hg is oxidised to Hg_2O.

Answer: B

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45. Sulphur molecule is

A. diatomic

B. triatomic

C. tetratomic

D. octa-atomic

Answer: D

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46. Choose the correct statements from the following?

A. Rhombic sulphur is blue in colour.

B. Rhombic sulphur is soluble in water but insoluble in organic solvents.

C. Rhombic and monoclinic sulphur have S6 molecules.

D. In Cyclo-S_6 molecule, the ring adopts chair form.

Answer: D

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47. Which of the following is correct representation of reaction of acidified permanganate solution with sulphur dioxide?

A. $2MnO_4^- + 5SO_2 + 2H_2O \rightarrow 5SO_4^{2-} + 2Mn^{2+} + 4H^+$

B. $MnO_4^- + SO_2 + 2H_2O \rightarrow S + Mn^{2+} + 4H^+$

C.

$$2MnO_4^- + 5SO_2 + 2H_2O \rightarrow 4SO_3^{2-} + S + 2Mn^{2+} + 4H^+$$

D. $3MnO_4^- + 2SO_2 + 2H_2O \rightarrow 2S + 3Mn^{2+} + 4H^+$

Answer: A

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48. Why is sulphur dioxide considered as an air pollutant?

A. It increases the temperature of the atmosphere.

B. It is used as insecticide which causes air pollution.

C. It causes acid rain due to formation of sulphuric acid on combining with O_2 and H_2O.

D. It is a strong oxidising agent hence oxidises the other components of air.

Answer: C

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49. Dry SO_2 does not bleach dry flowers because

A. nascent hydrogen responsible for bleaching is produced only in presence of moisture

B. water is the actual reducing agent responsible for bleaching

C. water is stronger acid than SO_2

D. the OH^- ions produced by water cause bleaching.

Answer: A

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50. Which of the following statements is not correct for SO_2 gas?

A. It acts as bleaching agent in moist conditions.

B. Its dilute solution is used as disinfectant.

C. Its molecules have linear geometry.

D. Acidified $KMnO_4$ is decolourised when SO_2 is passed through it.

Answer: C

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51. Which of the following statements is not correct?

A. 1. Oxygen molecule is paramagnetic with two unpaired electrons.

B. 2. Sulphur shows maximum covalency of four.

C. 3. Ozone can be easily detected by mercury.

D. 4. Both sulphurous and sulphuric acid are dibasic in nature.

Answer: B

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52. The oxyacid of sulphur that contains a lone pair of electrons in sulphur is

A. 1. sulphurous acid

B. 2. sulphuric acid

C. 3. peroxodisulphuric acid

D. 4. pyrosulphuric acid.

Answer: A

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53. In which of the following sulphur is present in +5 oxidation state?

A. 1. Dithionic acid

B. 2. Sulphurous acid

C. 3. Sulphuric acid

D. 4. Disulphuric acid

Answer: A

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54. The oxidation states of sulphur in the anions SO_3^{2-}, $S_2O_4^{2-}$, and $S_2O_6^{2-}$ follow the order

A. $S_2O_6^{2-} < S_2O_4^{2-} < SO_3^{2-}$

B. $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$

C. $SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$

D. $S_2O_4^{-} + < S_2O_6^{2-} < SO_3^{2-}$

Answer: B

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55. The hybridisation state of the central atom and shape of the molecules is given below. Mark the incorrect combination.

A. $SO_3 - sp^2$ hybridisation, planar triangular

B. $SO_2 - sp^2$ hybridisation, V-shaped

C. $H_2SO_4 - sp^2$ hybridisation, V-shaped

D. $O_3 - sp^2$ hybridisation, angular

Answer: C

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56. Sulphur trioxide is not directly dissolved in water to form sulphuric acid because

A. 1. SO_3 does not react with water to form acid

B. 2. SO_3 gets oxidised to H_2SO_3 when dissolved in water

C. 3. it results in the formation of dense fog of sulphuric acid which is difficult to condense

D. 4. sulphur trioxide is insoluble in water due to its covalent nature.

Answer: C

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57. Which of the following pairs is not correctly matched.

A. Allotropic form of sulphur which is more stable at room temperature - Rhombic

B. The hydride of group 16 which is liquid at room temperature - Water

C. The gas formed in the upper layers of atmosphere by action of UV radiations - Nitrogen

D. The catalyst used in the manufacture of H_2SO_4 by contact process - Vanadium pentoxide

Answer: C

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58. Fill in the blanks by choosing the appropriate option.

Cone. H_2SO_4 chars paper, wood and sugar by removing (i) from them. It is also known as (ii) It is manufactured by (iii) process. It is a strong (iv) and (v) acid.

A.

(i)	(ii)	(iii)	(iv)	(v)
H_2O	oil of vitriol	Contact	oxidising	dibasic

B.

(i)	(ii)	(iii)	(iv)	(v)
O_2	oil of vitriol	Oleum	dehydrating	monobasic

C.

(i)	(ii)	(iii)	(iv)	(v)
H_2O	oil of olay	Solvay	dehydrating	dibasic

D.

(i)	(ii)	(iii)	(iv)	(v)
SO_2	oil of winter green	Contact	oxidising	monobasic

Answer: A

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59. An amorphous solid (X) burns in air to form a gas (Y) which turns lime water milky. This gas decolourises aqueous solution of acidified $KMnO_4$. Gas (Y) reacts with oxygen to give another gas (Z) which is responsible for acid rain. X, Y and Z are

A. $\begin{matrix} \text{X} & \text{Y} & \text{Z} \\ C & CO & CO_2 \end{matrix}$

B. $\begin{matrix} \text{X} & \text{Y} & \text{Z} \\ S & SO_2 & SO_3 \end{matrix}$

C. $\begin{matrix} \text{X} & \text{Y} & \text{Z} \\ P & P_2O_3 & P_2O_5 \end{matrix}$

D. $\begin{matrix} \text{X} & \text{Y} & \text{Z} \\ S & SO_3 & H_2SO_4 \end{matrix}$

Answer: B

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60. The correct order of increasing electron affinity of halogens is

A. $I < Br < Cl$

B. $Br < I < Cl$

C. $Cl < Br < I$

D. $I < Cl < Br$

Answer: A

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61. Which of the following gives correct arrangement of compounds involved based on their bond strength?

A. $HF > HCl > HBr > HI$

B. $HI > HBr > HCl > HF$

C. $HCl > HF > HBr > HI$

D. $HF > HBr > HCl > HI$

Answer: A

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62. The comparatively high b.pt. of HF is due to

A. high reactivity of fluorine

B. small size of hydrogen atom

C. formation of hydrogen bonds

D. small size of fluorine.

Answer: C

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63. Fill in the blanks.

The high reactivity of fluorine is due to its ___ dissociation energy. Its shows ____ only oxidation state. It has ___ electron affinity than chlorine. Among all hydrogen halides boiling point is highest for____.

A. low, -1, lower, HF

B. high,+ 1, higher, HF

C. low, +1, lower, HCl

D. high, -1, higher, HF

Answer: A

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64. The property of halogens which is not correctly matched is

A. $F > Cl > Br > I$ (Ionisation energy)

B. $F > Cl > Br > I$ (Electronegativity)

C. $I > Br > Cl > F$ (Density)

D. $F > Cl > Br > I$ (Electron affinity)

Answer: D

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65. Mark the correct statements about halogens.

A. Electron affinity of halogens is in the order $F > Cl > Br > I.$

B. HF is the strongest hydrohalic acid.

C. F_2 has lower bond dissociation energy than Cl_2

D. All halogens show variable oxidation states.

Answer: C

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66. The element of group 17 whose half life is in milliseconds only is

A. 1. Ts

B. 2. Te

C. 3. At

D. 4. Og

Answer: A

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67. Fluorine is the best oxidising agent because it has

A. 1. highest electron affinity

B. 2. highest reduction potential

C. 3. highest oxidation potential

D. 4. lowest electron affinity.

Answer: B

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68. Which of the following statements is not correct?

A. All the oxides of halogens are powerful oxidants.

B. The compounds of oxygen and fluorine are not called oxides but fluorides.

C. Oxygen fluorides form oxoacids.

D. In oxyhalides, bonds are mainly covalent due to small difference in electronegativity of oxygen and halogens.

Answer: C

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69. Which of the following is used to prepare Cl_2 gas at room temperature from concentrated HCl ?

A. MnO_2

B. H_2S

C. $KMnO_4$

D. Cr_2O_3

Answer: C

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70. If chlorine is passed through a solution of hydrogen sulphide in water, the solution turns turbid due to the formation of

A. free chlorine

B. free sulphur

C. nascent oxygen

D. nascent hydrogen

Answer: B

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71. A balck powder when heated with Conc. HCI gives a greenish yellow. Gas. The gas as an oxidising and bleaching agent. When it is passed over slake lime, a white poweder is formed which is a ready source of gas. The back powder and white powder respectively are

A. $KClO_3$ and $NaClO_3$

B. MnO_2 and $Ca(OCl)_2$

C. MnO_2 and $KClO_3$

D. $MnCl_4$ and $COCl_2$

Answer: B

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72. HCl can be prepared by

A. $NaCl + H_2SO_4 \xrightarrow{420K}$

B. $NaHSO_4 + NaCl \xrightarrow{820K}$

C. $NaNO_3 + H_2SO_4$

D. both (a) and (b).

Answer: D

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73. When three parts of cone. HCl and one part of cone. HNO_3 is mixed, a compound 'X' is formed. The correct option related to 'X' is

A. 'X' is known as aqua-regia

B. 'X' is used for dissolving gold

C. 'X' is used for decomposition of salts of weaker acids

D. both (a) and (b).

Answer: D

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74. The correct order of acidity of oxoacids of halogens is

A. $HClO < HClO_2 < HClO_3 < HClO_4$

B. $HClO_4 < HClO_3 < HClO_2 < HClO$

C. $HClO < HClO_4 < HClO_3 < HClO_2$

D. $HClO_4 < HClO_2 < HClO_3 < HClO$

Answer: A

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75. The following acids have been arranged in order of decreasing acid strength. Identify the correct order.

ClOH (I) , BrOH (II) , IOH(III)

A. $I > II > III$

B. $II > I > III$

C. $III > II > I$

D. $I > III > II$

Answer: A

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76. Which of the following increasing order is not correct as mentioned in the property with it?

A. $HClO < HClO_2 < HClO_3 < HClO_4$ (thermal stability)

B. $HClO_4 < HClO_3 < HClO_2 < HClO$ (oxidising power)

C. $F^- < Cl^- < Br^- < I^-$ (reducing nature)

D. $HIO_4 < ICl < I_2 < HI$ (oxidation number of iodine)

Answer: D

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77. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	$(CN)_2$	(i)	Hydrogen bonding
(B)	IF_7	(ii)	Deacon's process
(C)	Cl_2	(iii)	Pseudohalogen
(D)	HF	(iv)	sp^3d^3 hybridisation

A. $(A) \rightarrow (iv), (B) \rightarrow (i), (C) \rightarrow (iii), (D) \rightarrow (ii)$

B. $(A) \rightarrow (ii), (B) \rightarrow (iii), (C) \rightarrow (iv), (D) \rightarrow (i)$

C. $(A) \rightarrow (iii), (B) \rightarrow (iv), (C) \rightarrow (ii), (D) \rightarrow (i)$

D. $(A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iv), (D) \rightarrow (iii)$

Answer: C

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78. Interhalogen compounds are more reactive than the individual halogens because

A. they are prepared by direct combination of halogens

B. X-X' bond is weaker than X-X or X' -X' bonds

C. they are thermally more stable than halogens

D. there is a large difference in their electronegativity.

Answer: B

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79. Xenon has closed shell configuration but is known to give compounds with fluorine because

A. Xe atom has large size and lower ionisation potential as compared to other noble gases

B. Xe has unpaired electrons which can form covalent bonds

C. Xe has highest boiling point hence it can form compounds with fluorine

D. fluorine is the smallest element hence it can react with all noble gases.

Answer: A

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80. Which compound is prepared by the following reaction ?

$$\underset{(\text{2:1 volume ratio})}{Xe + F_2} \xrightarrow[673K]{Ni}$$

A. XeF_4

B. XeF_2

C. XeF_6

D. None of these.

Answer: B

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81. Which of the following statements is not correct about XeF_2?

A. It can be obtained by direct reaction between F_2 and Xe at high pressure.

B. XeF_2 undergoes alkaline hydrolysis to give O_2 and Xe.

C. XeF_2 is a powerful oxidising agent.

D. XeF_2 contains two bond pairs and three lone pairs.

Answer: C

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82. In the clathrates of xenon with water the nature of bonding in Xe and H_2O molecule is

A. covalent

B. hydrogen bonding

C. coordinate

D. dipole-induced dipole.

Answer: D

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83. Complete the following reactions by filling the appropriate choice.

$A.\ 6XeF_4 + 12H_2O \rightarrow 4Xe + 2XeO_3 + (i) + (ii)$

$B.\ XeF_6 + 3H_2O \rightarrow (iii) + 6HF$

A. (i) (ii) (iii)
F_2 H_2O $XeOF_4$

B. (i) (ii) (iii)
$24HF$ $3O_2$ XeO_3

C. (i) (ii) (iii)
$2HF$ $2H_2O$ XeO

D. (i) (ii) (iii)
HF H_2O Xe_2O_3

Answer: B

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84. Among the following molecules

$(i) XeO_3 (ii) XeOF_4 (iii) XeF_6$

those having same number of lone pairs on Xe are

A. (i) and (ii) only

B. (i) and (iii) only

C. (ii) and (iii) only

D. (i), (ii) and (iii)

Answer: D

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85. In XeF_2, XeF_4 and XeF_6, the number of the lone pairs of Xe respectively are

A. 2, 3, 1

B. 1,2,3

C. 4, l, 2

D. 3, 2, 1

Answer: D

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86. Oganesson has been synthetically produced by collision of

A. Ra and Ca

B. Cf and Ca

C. Cf and Cu

D. Ra and He

Answer: B

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87. Fill in the blanks by choosing the appropriate option. The noble gases can form compounds with (i) and (ii) . The mixture of (iii) and (iv) is used for respiration by divers.

A. (i) iodine (ii) oxygen (iii) oxygen (iv) argon

B. (i) fluorine (ii) oxygen (iii) helium (iv) oxygen

C. (i) xenon (ii) platinum (iii) argon (iv) krypton

D. (i) helium (ii) oxygen (iii) xenon (iv) argon

Answer: B

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88. Which of the following is not a use of noble gases?

A. Argon is widely used for filling incandescent electric bulbs.

B. Neon is used in safety devices for protecting electrical instruments.

C. Radon is used in radiotherapy of cancer.

D. Helium is filled in tubes of cycles and scooters tyres.

Answer: D

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89. Which of the following statements is not correct?

A. Helium has the lowest boiling point among the noble gases

B. Argon is used in electric bulbs

C. Krypton is obtained during radioactive disintegration

D. $Xe \quad \text{forms} \quad XeF_6$.

Answer: C

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Hots

1. White phosphorus reacts with chlorine and the product hydrolyses in the presence of water. Calcualte the mass of HCl obtained by the hydrolysis of the product formed by the reaction of 62 g of white phosphorus with chlorine in the presence of water.

A. 200 g

B. 400 g

C. 219 g

D. 100 g

Answer: C

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2. Oxyacids of phosphorous and the starting materials for their preparation are given below.

	Ocyacid		Matereifal for preparation
(A)	H_3PO_2	(i)	Red P + alpali
(B)	H_3P_3	(ii)	$P_4O_{10} + H_2O$
(C)	H_3PO_4	(iii)	$P_2O_3 + H_2O$
(D)	$H_4P_2O_6$	(iv)	White P+ alkali

Choose the correct answer from the codes given below:

A. (A) - (iv), (B) - (iii), (C) - (ii), (D) - (i)

B. (A) - (i), (B) - (iii), (C) - (ii), (D) - (iv)

C. (A) - (iv), (B) - (iii), (C) - (i), (D) - (ii)

D. (A) - (ii), (B) - (iii), (C) - (i), (D) - (iv)

Answer: A

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3. Which of the following statements are incorrect ?

A. SO_3 is a stronger oxidising agent and more acidic than SO_2

.

B. Selenium forms only two oxoacids i.e., selenous acid (H_2SeO_3) and selenic acid (H_2SeO_4).

C. The acidic strength and oxidising power of oxoacids is greater in +6 oxidation state than in +4 oxidation state.

D. The thermal stability of oxides of group 16 elements decreases in the order : $SO_2 > SeO_2 > TeO_2 > PoO_2$

Answer: D

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4. Consider the following substances :

1. OF_2 2. Cl_2O 3. Br_2O

The correct sequence X - O - X bond angle is

A. $1 > 2 > 3$

B. $3 > 2 > 1$

C. $2 > 1 > 3$

D. $1 > 3 > 2$

Answer: B

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5. The reactions of CI_2 gas with cold-dilute and hot-concentrated NaOH in water give sodium salts of two different oxioacids of chlorine, P and Q, respectively. The CI_2 gas reacts with SO_2 gas, in presence of charocal, to give a product R reacts with white phosphorus to give a compound S. On hydrolysis, S gives an oxoacid of phosphorus.

R, S and T, respectively, are

A. SO_2Cl_2, PCl_5 and H_3PO_4

B. SO_2Cl_2, PCl_3 and H_3PO_3

C. $SOCl_2, PCl_3$ and H_3PO_2

D. $SOCl_2, PCl_5$ and H_3PO_4

Answer: A

Watch Video Solution

6. The reactions of CI_2 gas with cold-dilute and hot-concentrated NaOH in water give sodium salts of two different oxioacids of chlorine, P and Q, respectively. The CI_2 gas reacts with SO_2 gas, in presence of charocal, to give a product R reacts with white phosphorus to give a compound S. On hydrolysis, S gives an oxoacid of phosphorus.

P and Q, respectively, are the sodium salts of

A. hypochlorous and chloric acids

B. hypochlorous and chlorous acids

C. chloric and perchloric acids

D. chloric and hypochlorous acids.

Answer: A

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7. Which among the following statements is incorrect?

A. 1. XeF_4 and SbF_5 combine to form salt.

B. 2. He and Ne do not form clathrates.

C. 3. He has highest boiling point in its group.

D. 4. He diffuses through rubber and polyvinyl chloride.

Answer: C

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Examplar Problems

1. On addition 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. 1. H_2SO_4 reduces HI to I_2

B. 2. HI is of violet colour

C. 3. HI gets oxidised to I_2

D. 4. HI changes to HIO_3.

Answer: C

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2. In qualitative analysis when H_2S is passed through an aqueous solution of salt acidified with dil. HCl, a black precipitate is obtained. On boiling the precipitate with dil. HNO_3, it forms a solution of blue colour. Addition of excess of aqueous solution of ammonia to this solution gives

A. 1. deep blue precipitate of $Cu(OH)_2$

B. 2. deep blue solution of $\left[Cu(NH_3)_4\right]^{2+}$

C. 3. deep blue solution of $Cu(NO_3)_2$

D. 4. deep blue solution of $Cu(OH)_2$. $Cu(NO_3)_2$

Answer: B

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3. In a cyclotrimetaphosphoric acid molecule, how many single and double bonds are present ?

A. 3 double bonds, 9 single bonds

B. 6 double bonds, 6 single bonds

C. 3 double bonds, 12 single bonds

D. Zero double bonds, 12 single bonds

Answer: C

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4. Which of the following elements can be involved in $p\pi - d\pi$ bonding ?

A. Carbon

B. Nitrogen

C. Phosphorus

D. Boron

Answer: C

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5. Which of the following pairs of ions are isoelectronic and isostructural?

A. CO_3^{2-}, NO_3^-

B. ClO_3^-, CO_3^{2-}

C. SO_3^{2-}, NO_3^-

D. ClO_3^-, SO_3^{2-}

Answer: A

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6. Affinity for hydrogen decreases in the group from fluorine to iodine. Which of the halogen acids should have highest bond dissociation enthalpy?

A. 1. HF

B. 2. HCl

C. 3. HBr

D. 4. HI

Answer: A

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7. On heating with concentrated NaOH solution in an inert atmosphere of CO_2, white phosphorus gives a gas. Which of the following statements is incorrect about the gas ?

A. 1. It is highly poisonous and has smell like rotten fish.

B. 2. Its solution in water decomposes in the presence of light.

C. 3. It is more basic than NH_3

D. 4. It is less basic than NH_3.

Answer: C

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8. Which of the following acids forms three series of salts?

A. H_3PO_2

B. H_3BO_3

C. H_3PO_4

D. H_3PO_3

Answer: C

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9. Strong reducing behaviour of H_3PO_2 is due to

A. 1. low oxidation state of phosphorus

B. 2. presence of two - OH groups and one P-H bond

C. 3. presence of one - OH group and two P-H bonds

D. 4. high electron gain enthalpy of phosphorus.

Answer: C

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10. On heating lead nitrate forms oxides of nitrogen and lead. The oxides formed are :

A. 1. N_2O, PbO

B. 2. NO_2, PbO

C. 3. NO, PbO

D. 4. NO, PbO_2

Answer: B

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11. Which of the following elements does not show allotropy ?

A. 1. Nitrogen

B. 2. Bismuth

C. 3. Antimony

D. 4. Arsenic

Answer: B

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12. Maximum covalency of nitrogen is :

A. 3

B. 5

C. 4

D. 6

Answer: C

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13. Which of the following statements is wrong?

A. Single N-N bond is stronger than the single P-P bond.

B. PH_3 can act as a ligand in the formation of coordination compound with transition elements.

C. NO_2 is paramagnetic in nature.

D. Covalency of nitrogen in N_2O_5 is four.

Answer: A

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14. A brown ring is formed in the ring test for NO_3^- ion. It is due to the formation of

A. $\left[Fe(H_2O)_5(NO)\right]^{2+}$

B. $FeSO_4 \cdot NO_2$

C. $\left[Fe(H_2O)_4(NO)_2\right]^{2+}$

D. $FeSO_4 \cdot HNO_3$

Answer: A

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15. Elements of group 15 form compounds in $+5$ oxidatin state. However, bismuth forms only one well characterised compound in $+5$ oxidation state. The compound is

A. Bi_2O_5

B. BiF_3

C. $BiCl_5$

D. Bi_2S_5

Answer: B

View Text Solution

16. On heating ammonium dichromate and barium azide separately we get

A. N_2 in both cases

B. N_2 with ammonium dichromate and NO with barium azide

C. N_2O with ammonium dichromate and N_2 with barium azide

D. N_2O with ammonium dichromate and NO_2 with barium azide.

Answer: A

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17. In the preparation of HNO_3, we get NO gas by catalytic oxidation of ammonia . The moles of No produced by the oxidation of two moles of NH_3 will be ..... .

A. 2

B. 3

C. 4

D. 6

Answer: A

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18. The oxidation state of central atom in the anion of compound NaH_2PO_2 will be .....

A. $+3$

B. $+5$

C. $+1$

D. -3

Answer: C

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19. Which of the following is not tetrahedral in shape ?

A. NH_4^+

B. $SiCl_4$

C. SF_4

D. SO_4^{2-}

Answer: C

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20. Which of the following are peroxoacids of sulphur ?

A. H_2SO_5 and $H_2S_2O_8$

B. H_2SO_5 and $H_2S_2O_7$

C. $H_2S_2O_7$ and $H_2S_2O_8$

D. $H_2S_2O_6$ and $H_2S_2O_8$

Answer: A

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21. Hot conc. H_2SO_4 acts as moderately strong oxidising agent. It oxidises both metals and non-metals. Which of the following elements is oxidised by conc. H_2SO_4 into two gaseous products ?

A. Cu

B. S

C. C

D. Zn

Answer: C

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22. A black compound of manganese reacts with a halogen acid to give greenish yellow gas. When excess of this gas reacts with `NH_(3)` an unstable trihalide is formed. In this process the oxidation state of nitrogen changes from .....

A. $-3 \text{ to } +3$

B. $-3 \text{ to} 0$

C. $-3 \text{ to } +5$

D. $0 \text{ to } -3$

Answer: A

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23. In the preparation of compounds of Xe, Bartlett had taken $O_2^+ PtF_6^-$ as a base compound. This is because

A. both O_2 and Xe have same size

B. both O_2 and Xe have same electron gain enthalpy

C. both O_2 and Xe have almost same ionisation enthalpy

D. both Xe and O_2 are gases.

Answer: C

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24. In solid state, PCl_5 is a.....

A. covalent solid

B. octahedral structure

C. ionic solid with $[PCl_6]^+$ octahedral and $[PCl_4]^-$ tetrahedral

D. ionic solid with $[PCl_4]^+$ tetrahedral and $[PCl_6]^-$ octahedral

Answer: D

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25. Which of the following is isoelectronic pair ?

A. ICl_2, ClO_2

B. $BrO_2^- BrF_2^+$

C. ClO_2, BrF

D. CN^-, O_3

Answer: B

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Assertion Reason

1. Assertion : The covalence of nitrogen in N_2O_5 is 5

Reason : Nitrogen can expand its covalence beyond 4.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D

View Text Solution

2. Assertion : Catenation tendency is weaker in nitrogen.

Reason : Nitrogen exists as diatomic gas.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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3. Assertion: Ammonia acts as a ligand.

Reason : A lone pair of electrons on nitrogen can be donated to acceptor.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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4. Assertion : White phosphorus is more reactive than red phosphorus.

Reason : It readily catches fire in air to give dense white fumes of P_4O_{10}.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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5. Assertion : In trigonal bipyramidal structure two axial bonds are longer than the equatorial bonds.

Reason : Axial bonds suffer more repulsion as compared to equatorial bonds.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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6. Assertion : Acidic character of group 16 hydrides increases from H_2O to H_2Te.

Reason : Thermal stablility of hydrides decreases down the group.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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7. Assertion : Ozone layer in the upper region of atmosphere protects earth from UV radiations of sun.

Reason : Ozone is a powerful oxidising agent as compared to oxygen.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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8. Assertion : O_3 acts as a powerful oxidising agent.

Reason : O_3 oxidises lead sulphide to lead sulphate and iodide ions to iodine.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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9. Assertion: In vapour state sulphur is paramagnetic in nature.

Reason : In vapour state sulphur exists as S_2 molecule.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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10. Assertion : Sulphuric acid reacts with sodium chloride in the following way: $2NaCl + H_2SO_4 \rightarrow 2HCl + Na_2SO_4$

Reason : Sulphuric acid because of its low volatility can be used to manufacture more volatile acids from their corresponding salts.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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11. Assertion : Fluorine combines with sulphur to form SF_6 but no other halogen forms hexahalide with sulphur.

Reason : The reactivity of halogens increases as the atomic number increases.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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12. Assertion : Fluorine oxidises water to oxygen whereas chlorine and bromine react with water to form corresponding hydrohalic

and hypohalous acids.

Reason : The reactivity of halogens increases down the group.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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13. Assertion: $HClO_4$ is a stronger acid than $HClO_3$.

Reason: Oxidation state of Cl in $HClO_4$ is $+VII$ and in

$HClO_3 + V$.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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14. Assertion : Interhalogen compounds are more reactive than halogens (except fluorine)

Reason : They all undergo hydrolysis giving halide ion derived from the smaller halogen and anion derived from larger halogen.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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15. Assertion :Solubility of noble gases in water decreases with increases in atomic size

Reason :Solubility of noble gases in water is due to instantaneous dipole induced dipole interaction

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D

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Group 15 Elements The Nitrogen Family

1. Fill in the blanks by choosing an appropriate option.

(i) "--------" is a synthetic radioactive element of group 15 having electronic configuration (ii) "----------"

A. (i) (ii)
$_{115}Mc$ $[Rn]5f^{14}6d^{10}7s^27p^3$

B. (i) (ii)
$_{115}Mc$ $[Xe]5f^{14}6d^{10}7s^27p^3$

C. (i) (ii)
$_{116}Lv$ $[Rn]5f^{14}6d^{10}7s^27p^4$

D. (i) (ii)
$_{114}Fl$ $[Rn]5f^{14}6d^{10}7s^27p^2$

Answer: A

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2. The oxidation state of nitrogen is highest in

A. N_3H

B. NH_3

C. NH_2OH

D. N_2H_4

Answer: A

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3. Which of the following shows nitrogen with its increasing order of oxidation number.

A. $N_2O < NO < NO_2 < NO_3^- < NH_4^+$

B. $NH_4^+ < N_2O < NO < NO_2 < NO_3^-$

C. $NH_4^+ < N_2O < NO_2 < NO_3^- < NO$

D. $NH_4^+ < NO < N_2O < NO_2 < NO_3^-$

Answer: B

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4. Nitrogen forms N_2 but phosphorous when forms P_2 gets readily converted into P_4 because

A. $p\pi - p\pi$ bonding is strong in phosphorus

B. $p\pi - p\pi$ bonding is weak in phosphorus

C. triple bond is present in phosphorus

D. single P - P bond is weaker than N -N bond.

Answer: B

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5. The decreasing order of boiling points of the following hydrides is

A. $SbH_3 > AsH_3 > PH_3 > NH_3$

B. $NH_3 > SbH_3 > AsH_3 > PH_3$

C. $SbH_3 > NH_3 > AsH_3 > PH_3$

D. $PH_3 > AsH_3 > SbH_3 > NH_3$

Answer: C

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6. Nitrogen can form only one chloride with chlorine which is NCl_3 whereas P can form PCl_3 and PCl_5. This is

A. due to absence of d-orbitals in nitrogen

B. due to difference in size of N and P

C. due to higher reactivity of P towards Cl than N

D. due to presence of multiple bonding in nitrogen.

Answer: A

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Dinitrogen

1. On heating a mixture of NH_4Cl and KNO_2, we get

A. NH_4NO_3

B. $KNH_4(NO_3)_2$

C. N_2

D. NO

Answer: C

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2. Nitrogen is relatively inactive element because

A. its atoms has a stable electronic configuration

B. it has low atomic radius

C. its electronegativity is fairly high

D. dissociation energy of its molecule is fairly high.

Answer: D

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3. Nitrogen comnines with metals to form

A. nitrites

B. nitrates

C. nitrosyl chloride

D. nitrides

Answer: D

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4. Nitrogen is used to fill electric bulbs because

A. it is lighter than air

B. it makes the bulb to glow

C. it does not support combustion

D. it is non-toxic.

Answer: C

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Ammonia

1. Which of the following compounds will not give ammonia on heating?

A. $(NH_4)_2SO_4$

B. NH_2CONH_2

C. NH_4NO_2

D. NH_4Cl

Answer: C

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2. Which of the following factors would favour the formation of ammonia?

A. High pressure

B. Low temperature

C. High volume

D. Low pressure

Answer: A

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3. Ammonia is a Lewis base. It forms complexes with cations. Which one of the following cations does not form complex with ammonia?

A. Ag^{+}

B. Cu^{2+}

C. Cd^{2+}

D. Pb^{2+}

Answer: D

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4. Ammonia is used in detection of Cu^{2+} ion because

A. 1. aqueous solution of NH_3 reacts with Cu^{2+} ion to form deep blue coloured complex

B. 2. NH_3 reacts with Cu^{2+} ion to give blue precipitate of CuO

C. 3. aqueous solution of NH_3 reacts with Cu^{2+} ion to form white coloured complex

D. 4. NH_3 reacts with Cu_{2+} ion to give green precipitate.

Answer: A

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Oxides Of Nitrogen

1. Consider the following sequence of conversion.

$$\underbrace{2NO + O_2}_{(X)} \Leftrightarrow \underset{(Y)}{2NO_2} \underset{\text{heat}}{\overset{\text{cool}}{\Longleftrightarrow}} \underset{(Z)}{N_2O_4}$$

X, Y and Z can be described as

A. 1.

X	Y	Z
Colourless	Brown paramagnetic	Colourless diamagnetic

B. 2.

X	Y	Z
Brown	Colourless diamagnetic	Brown paramagnetic

C. 3.

X	Y	Z
Colourless	Colourless, paramagnetic	Brown diamagnetic

D. 4.

X	Y	Z
Brown	Brown paramagnetic	Brown diamagnetic

Answer: A

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2. Which oxide of nitrogen is obtained on heating ammonium nitrate at $250^\circ C$?

A. Nitric oxide

B. Nitrous oxide

C. Nitrogen dioxide

D. Dinitrogen tetraoxide

Answer: B

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3. Which of the following oxides is an anhydride of nitrous acid?

A. N_2O_3

B. NO_2

C. NO

D. N_2O_4

Answer: A

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Nitric Acid

1. A gas (X) is obtained when copper reacts with dilute HNO_3. The gas thus formed reacts with oxygen to give brown fumes of (Y). (Y) when dissolved in water gives an important acid (Z) and the gas (X). X, Y and Z respectively are

A. NO, NO_2, HNO_3

B. NO_2, NO, HNO_3

C. N_2O, NO, HNO_2

D. NO, N_2O, HNO_3

Answer: A

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2. Complete the given equations:

(i) $Cu + 8HNO_3 \rightarrow 3Cu(NO_3)_2 + \overset{W}{\ldots\ldots} + 4H_2O$

(ii) $4Zn + 10HNO_3 \rightarrow 4Zn(NO_3)_2 + 5H_2O + \overset{X}{\ldots\ldots}$

(iii) $l2 + 10HNO_3 \rightarrow \overset{Y}{\ldots\ldots} + 10NO_2 + 4H_2O$

A. W $2NO_2$ X NO Y $5HIO_3$

B. W $2NO$ X N_2O Y $2HIO_3$

C. W N_2 X NO_2 Y HI

D. W N_2O X NO_2 Y $3HI$

Answer: B

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Phosphorous Allotropic Forms

1. Atomicity of phosphorus is

A. 1. one

B. 2. two

C. 3. three

D. 4. four

Answer: D

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2. The structure of white phosphorus is

A. square planar

B. pyramidal

C. tetrahedral

D. trigonal planar

Answer: C

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3. Each of the following is true for white and red phosphorus except that they

A. 1. are both soluble in CS_2

B. 2. can be oxidized by heating in air

C. 3. consist of the same kind of atoms

D. 4. can be converted into one another.

Answer: A

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4. When white phosphorus is heated at 473 K under high pressure, what will happen?

A. α-Black phosphorus is formed.

B. β-Black phosphorus is formed.

C. Red phosphorus is formed.

D. No change would be observed.

Answer: B

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Phosphine

1. Phosphine is prepared by the action of

A. 1. P and H_2SO_4

B. 2. P and $NaOH$

C. 3. P and H_2S

D. 4. P and HNO_3

Answer: B

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2. Fill in the blanks :

(i) $Ca_3P_2 + 6HCl \rightarrow 3CaCl_2 + \ldots. p \ldots.$

(ii) $P_4 + 3NaOH + 3H_2O \rightarrow \ldots q \ldots + 3NaH_2PO_2$

(iii) $PH_4I + KOH \rightarrow KI + H_2O + \ldots r \ldots$ p, q and r respectively are

A. a. PH_3, H_3PO_3, Pl_3

B. b. PH_3, PH_3, PH_3

C. c. PCl_3, H_3PO_4, PH_3

D. d. PCl_5, PH_3, P_4O_6

Answer: B

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3. Holme's signal uses chemical compound

A. 1. calcium carbide

B. 2. calcium phosphide

C. 3. calcium carbide and calcium phosphide

D. 4. calcium carbide and aluminium carbide.

Answer: C

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Phosphorus Halides

1. A translucent white waxy solid (A) reacts with excess of chlorine to give a yellowish white powder (B). (B) reacts with organic compounds containing -OH group converting them into chloro derivatives. (B) on hydrolysis gives (C) and is finally converted to phosphoric acid. (A), (B) and (C) are

A. 1. P_4, PCl_3, H_3PO_4

B. 2. P_4, PCl_5, H_3PO_3

C. 3. P_4, PCl_5, $POCl_3$

D. 4. P_4, PCl_3, $POCl_3$

Answer: C

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2. Which of the following is not correctly matched?

A. $PCl_5 - sp^3d$ hybridisation

B. $PCl_3 - sp^3$ hybridisation

C. $PCl_5 \quad (\text{solid}) \quad - [PtCl_4]^+ [PtCl_6]^-$

D. PCl_5 - brownish powder

Answer: D

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3. On reaction with Cl_2, phosphorus forms two types of halides 'A' and 'B'. Halide 'A' is yellowish-white powder but halide 'B' is colourless oily liquid. What would be the hydrolysis products of 'A' and 'B' respectively?

A. H_3PO_4, H_3PO_3

B. $HOPO_3, H_2PO_2$

C. H_3PO_3, H_3PO_4

D. HPO_3, H_3PO_3

Answer: A

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4. Which of the following statements is not correct about the structure of PCl_5?

A. PCl_5 has a trigonal bipyramidal structure.

B. Three equatorial P-Cl bonds are equivalent.

C. The two axial bonds are different and longer than equatorial bonds.

D. Equatorial bond pairs suffer more repulsion than that of the axial bond pairs.

Answer: D

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5. Why all P - F bonds in PF_5 are not equivalent?

A. PF_5 has sp^3d hybridisation, out of five P-F bonds three are equatorial which have different lengths.

B. PF_5 has sp^3 hybridisation, out of five P-F bonds two are equatorial which have different lengths.

C. Out of five P-F bonds two are axial and three equatorial. All five bonds have different bond lengths.

D. PF_5 is made up of two types of bonds namely covalent and coordinate, hence are not equivalent.

Answer: A

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Oxoacids Of Phosphorus

1. Match the column I with column II and mark the appropriate choice.

	Column I		Column II
(A)	Laughing gas	(i)	Hydrazoic acid
(B)	Anhydride of HNO_3	(ii)	Nitrous oxide
(C)	Anhydride of HPO_3	(iii)	Nitrogen pentoxide
(D)	Acid hydride of nitrogen	(iv)	Phosphorus pentoxide

A. $(A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iii), (D) \rightarrow (iv)$

B. $(A) \rightarrow (iv), (B) \rightarrow (i), (C) \rightarrow (ii), (D) \rightarrow (iii)$

C. $(A) \rightarrow (ii), (B) \rightarrow (iii), (C) \rightarrow (iv), (D) \rightarrow (i)$

D. $(A) \rightarrow (iii), (B) \rightarrow (iv), (C) \rightarrow (i), (D) \rightarrow (ii)$

Answer: C

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2. The number of $P - O - P$ bonds in cyclotrimetaphosphoric acid, $(HPO_3)_3$ is

A. Four

B. Three

C. Two

D. One

Answer: B

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3. Which of the following is a tetrabasic acid?

A. Hypophosphorous acid

B. Metaphosphoric acid

C. Pyrophosphoric acid

D. Orthophosphoric acid

Answer: C

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4. Match the column I and column II and mark the appropriate choice.

Column I		Column II	
(A)	H_3PO_2	(i)	+3 O.S. of P
(B)	$H_3P_3O_9$	(ii)	Cyclic oxoacid
(C)	$H_4P_2O_6$	(iii)	Monobasic acid
(D)	H_3PO_3	(iv)	One P – P bond

A. $(A) \rightarrow (i), (B) \rightarrow (iii), (C) \rightarrow (ii), (D) \rightarrow (iv)$

B. $(A) \rightarrow (ii), (B) \rightarrow (iv), (C) \rightarrow (iii), (D) \rightarrow (i)$

C. $(A) \rightarrow (iii), (B) \rightarrow (ii), (C) \rightarrow (iv), (D) \rightarrow (i)$

D. $(A) \rightarrow (iv), (B) \rightarrow (i), ((C)) \rightarrow (ii), (D) \rightarrow (iii)$

Answer: C

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5. Phosphorous acid on heating gives the following products:

$4H_3PO_3 \xrightarrow{\Delta} 3H_3PO_4 + PH_3$ The above reaction is an example of

A. oxidation

B. thermal decomposition

C. disproportionation

D. reduction

Answer: C

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Group 16 Elements The Oxygen Family

1. Group 16 elements have lower value of first ionisation enthalpy as compared to group 15 elements because

A. half filled p-orbitals in group 15 elements are more stable

B. group 16 elements have smaller size than group 15 elements

C. group 16 elements contain double bond while group 15 elements have triple bond

D. group 16 elements have more number of electrons in p-orbitals.

Answer: A

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2. Covalency of oxygen cannot exceed 2 unlike sulphur which can show +4 or +6 because

A. oxygen atom does not have d-orbitals

B. oxygen atom has two unpaired electrons in its valence shell

C. oxygen can form a double bond with another oxygen atom

D. electrons of oxygen atom cannot be promoted to d-orbitals due to its small size.

Answer: A

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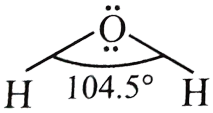
3. Bond angle in $H_2O(104.5^\circ)$ is higher than the bond angle of $H_2S(92.1^\circ)$. The difference is due to



A. O is diatomic and S is tetra-atomic

B. difference in electronegativity of S and O

C. difference in oxidation states of S and O

D. difference in shapes of hybrid orbitals of Sand O.

Answer: B

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4. Arrange the following hydrides of group 16 elements in order of increasing stability.

A. $H_2S < H_2O < H_2Te > H_2Se$

B. $H_2O < H_2Te < H_2Se < H_2S$

C. $H_2O < H_2S < H_2Se < H_2Te$

D. $H_2Te < H_2Se < H_2S < H_2O$

Answer: D

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5. Name of the synthetic radioactive element of group 16 having atomic number 116 is

A. Livermorium

B. Tennessine

C. Livernorium

D. Moscovium

Answer: A

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Dioxygen

1. On heating $KClO_3$ we get :

A. $KClO_2 + O_2$

B. $KCl + O_2$

C. $KCl + O_3$

D. $KCl + O_2 + O_3$

Answer: B

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2. Select the correct option regarding the properties of dioxygen?

A. 1. Dioxygen never reacts with metals.

B. 2. Dioxygen is diamagnetic in nature.

C. 3. Combination of dioxygen with other elements is highly exothermic process.

D. 4. Dioxygen liquefies at 55 K and freezes at 90 K.

Answer: C

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Simple Oxides

1. Which of the following is not correctly matched?

A. Acidic oxides - P_2O_5, NO_2, Cl_2O_7

B. Basic oxides - Na_2O, CaO, MgO

C. Neutral oxides - CO_2, CO, BeO

D. Amphoteric oxides - ZnO, SnO, Al_2O_3

Answer: C

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2. The correct order of acidic strength is

A. $K_2O > CaO > MgO$

B. $CO_2 > N_2O_5 > SO_3$

C. $Na_2O > MgO > Al_2O_3$

D. $Cl_2O_7 > SO_2 > P_4O_{10}$

Answer: D

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Ozone

1. Which of the following is the wrong statement?

A. Ozone is paramagnetic gas.

B. The two oxygen -oxygen bond length in ozone are identical.

C. O_3 molecule is bent.

D. Ozone is violet-black in solid state.

Answer: A

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2. Which one is not a property of ozone?

A. it acts as an oxidising agent in dry state.

B. oxidation of $KI \text{ into } KIO_2$.

C. PbS is oxidised to $PbSO_4$

D. Hg is oxidised to Hg_2O.

Answer: B

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Sulphur Allotropic Forms

1. Sulphur molecule is

A. diatomic

B. triatomic

C. tetratomic

D. octa-atomic

Answer: D

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2. Choose the correct statements from the following?

A. Rhombic sulphur is blue in colour.

B. Rhombic sulphur is soluble in water but insoluble in organic solvents.

C. Rhombic and monoclinic sulphur have S6 molecules.

D. In Cyclo-S_6 molecule, the ring adopts chair form.

Answer: D

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Sulphur Dioxide

1. Which of the following is correct representation of reaction of acidified permanganate solution with sulphur dioxide?

A. $2MnO_4^- + 5SO_2 + 2H_2O \rightarrow 5SO_4^{2-} + 2Mn^{2+} + 4H^+$

B. $MnO_4^- + SO_2 + 2H_2O \rightarrow S + Mn^{2+} + 4H^+$

C.

$$2MnO_4^- + 5SO_2 + 2H_2O \rightarrow 4SO_3^{2-} + S + 2Mn^{2+} + 4H^+$$

D. $3MnO_4^- + 2SO_2 + 2H_2O \rightarrow 2S + 3Mn^{2+} + 4H^+$

Answer: A

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2. Why is sulphur dioxide considered as an air pollutant?

A. It increases the temperature of the atmosphere.

B. It is used as insecticide which causes air pollution.

C. It causes acid rain due to formation of sulphuric acid on combining with O_2 and H_2O.

D. It is a strong oxidising agent hence oxidises the other components of air.

Answer: C

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3. Dry SO_2 does not bleach dry flowers because

A. nascent hydrogen responsible for bleaching is produced only in presence of moisture

B. water is the actual reducing agent responsible for bleaching

C. water is stronger acid than SO_2

D. the OH^- ions produced by water cause bleaching.

Answer: A

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4. Which of the following statements is not correct for SO_2 gas?

A. It acts as bleaching agent in moist conditions.

B. Its dilute solution is used as disinfectant.

C. Its molecules have linear geometry.

D. Acidified $KMnO_4$ is decolourised when SO_2 is passed through it.

Answer: C

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Oxoacids Of Sulphur

1. Which of the following statements is not correct?

A. 1. Oxygen molecule is paramagnetic with two unpaired electrons.

B. 2. Sulphur shows maximum covalency of four.

C. 3. Ozone can be easily detected by mercury.

D. 4. Both sulphurous and sulphuric acid are dibasic in nature.

Answer: B

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2. The oxyacid of sulphur that contains a lone pair of electrons in sulphur is

A. 1. sulphurous acid

B. 2. sulphuric acid

C. 3. peroxodisulphuric acid

D. 4. pyrosulphuric acid.

Answer: A

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3. In which of the following sulphur is present in +5 oxidation state?

A. 1. Dithionic acid

B. 2. Sulphurous acid

C. 3. Sulphuric acid

D. 4. Disulphuric acid

Answer: A

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4. The oxidation states of sulphur in the anions SO_3^{2-}, $S_2O_4^{2-}$, and $S_2O_6^{2-}$ follow the order

A. $S_2O_6^{2-} < S_2O_4^{2-} < SO_3^{2-}$

B. $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$

C. $SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$

D. $S_2O_4^{-} + < S_2O_6^{2-} < SO_3^{2-}$

Answer: B

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5. The hybridisation state of the central atom and shape of the molecules is given below. Mark the incorrect combination.

A. $SO_3 - sp^2$ hybridisation, planar triangular

B. $SO_2 - sp^2$ hybridisation, V-shaped

C. $H_2SO_4 - sp^2$ hybridisation, V-shaped

D. $O_3 - sp^2$ hybridisation, angular

Answer: C

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6. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Thiosulphuric acid	(i)	H_2SO_5
(B)	Caro's acid	(ii)	$H_2S_2O_6$
(C)	Marshall's acid	(iii)	$H_2S_2O_3$
(D)	Dithionic acid	(iv)	$H_2S_2O_8$

A. 1. $(A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iii), (D) \rightarrow (iv)$

B. 2. $(A) \rightarrow (iv), (B) \rightarrow (iii), (C) \rightarrow (ii), (D) \rightarrow (i)$

C. 3. $(A) \rightarrow (iii), (B) \rightarrow (i), (C) \rightarrow (iv), (D) \rightarrow (ii)$

D. 4. $(A) \rightarrow (ii), (B) \rightarrow (iii), (C) \rightarrow (i), (D) \rightarrow (iv)$

Answer: C

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7. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	H_2SO_3	(i)	+6, dibasic
(B)	H_2SO_5	(ii)	+5, dibasic
(C)	$H_2S_2O_6$	(iii)	+6, monobasic
(D)	H_2SO_4	(iv)	+4, dibasic

A. 1. $(A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iii), (D) \rightarrow (iv)$

B. 2. $(A) \rightarrow (ii), (B) \rightarrow (iii), (C) \rightarrow (i), (D) \rightarrow (iv)$

C. 3. $(A) \rightarrow (iii), (B) \rightarrow (iv), (C) \rightarrow (ii), (D) \rightarrow (i)$

D. 4. $(A) \rightarrow (iv), (B) \rightarrow (iii), (C) \rightarrow (ii), (D) \rightarrow (i)$

Answer: D

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Sulphuric Acids

1. Sulphur trioxide is not directly dissolved in water to form sulphuric acid because

A. 1. SO_3 does not react with water to form acid

B. 2. SO_3 gets oxidised to H_2SO_3 when dissolved in water

C. 3. it results in the formation of dense fog of sulphuric acid which is difficult to condense

D. 4. sulphur trioxide is insoluble in water due to its covalent nature.

Answer: C

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2. Which of the following pairs is not correctly matched.

A. Allotropic form of sulphur which is more stable at room temperature - Rhombic

B. The hydride of group 16 which is liquid at room temperature - Water

C. The gas formed in the upper layers of atmosphere by action of UV radiations - Nitrogen

D. The catalyst used in the manufacture of H_2SO_4 by contact process - Vanadium pentoxide

Answer: C

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3. Fill in the blanks by choosing the appropriate option.

Cone. H_2SO_4 chars paper, wood and sugar by removing (i) from

them. It is also known as (ii) It is manufactured by (iii) process. It is a strong (iv) and (v) acid.

A.

(i)	(ii)	(iii)	(iv)	(v)
H_2O	oil of vitriol	Contact	oxidising	dibasic

B.

(i)	(ii)	(iii)	(iv)	(v)
O_2	oil of vitriol	Oleum	dehydrating	monobasic

C.

(i)	(ii)	(iii)	(iv)	(v)
H_2O	oil of olay	Solvay	dehydrating	dibasic

D.

(i)	(ii)	(iii)	(iv)	(v)
SO_2	oil of winter green	Contact	oxidising	monobasic

Answer: A

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4. An amorphous solid (X) burns in air to form a gas (Y) which turns lime water milky. This gas decolourises aqueous solution of acidified $KMnO_4$. Gas (Y) reacts with oxygen to give another gas (Z) which is responsible for acid rain. X, Y and Z are

A. X Y Z
C CO CO_2

B. X Y Z
S SO_2 SO_3

C. X Y Z
P P_2O_3 P_2O_5

D. X Y Z
S SO_3 H_2SO_4

Answer: B

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Group 17 Elements The Halogen Family

1. The correct order of increasing electron affinity of halogens is

A. $I < Br < Cl$

B. $Br < I < Cl$

C. $Cl < Br < I$

D. $I < Cl < Br$

Answer: A

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2. Which of the following gives correct arrangement of compounds involved based on their bond strength?

A. $HF > HCl > HBr > HI$

B. $HI > HBr > HCl > HF$

C. $HCl > HF > HBr > HI$

D. $HF > HBr > HCl > HI$

Answer: A

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3. The comparatively high b.pt. of HF is due to

A. high reactivity of fluorine

B. small size of hydrogen atom

C. formation of hydrogen bonds

D. small size of fluorine.

Answer: C

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4. Fill in the blanks.

The high reactivity of fluorine is due to its ___ dissociation energy. Its shows _____ only oxidation state. It has ___ electron affinity than chlorine. Among all hydrogen halides boiling point is highest for_____.

A. low, -1, lower, HF

B. high,+ 1, higher, HF

C. low, +1, lower, HCl

D. high, -1, higher, HF

Answer: A

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5. The property of halogens which is not correctly matched is

A. $F > Cl > Br > I$ (Ionisation energy)

B. $F > Cl > Br > I$ (Electronegativity)

C. $I > Br > Cl > F$ (Density)

D. $F > Cl > Br > I$ (Electron affinity)

Answer: D

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6. Mark the correct statements about halogens.

A. Electron affinity of halogens is in the order $F > Cl > Br > I$.

B. HF is the strongest hydrohalic acid.

C. F_2 has lower bond dissociation energy than Cl_2

D. All halogens show variable oxidation states.

Answer: C

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7. Which one is the correct observation when Br_2 is treated with NaF, NaCl and NaI taken in three test tubes labelled as (I), (II) and (III) ?

A. 1. F_2 is liberated in (X) and Cl_2 in (Y).

B. 2. Only I_2 is liberated in (Z).

C. 3. Only Cl_2 is liberated in (Y).

D. 4. Only F_2 is liberated in (X).

Answer: B

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8. The element of group 17 whose half life is in milliseconds only is

A. 1. Ts

B. 2. Te

C. 3. At

D. 4. Og

Answer: A

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9. Fluorine is the best oxidising agent because it has

A. 1. highest electron affinity

B. 2. highest reduction potential

C. 3. highest oxidation potential

D. 4. lowest electron affinity.

Answer: B

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10. Which of the following statements is not correct?

A. All the oxides of halogens are powerful oxidants.

B. The compounds of oxygen and fluorine are not called oxides but fluorides.

C. Oxygen fluorides form oxoacids.

D. In oxyhalides, bonds are mainly covalent due to small difference in electronegativity of oxygen and halogens.

Answer: C

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Chlorine

1. Which of the following is used to prepare Cl_2 gas at room temperature from concentrated HCl ?

A. MnO_2

B. H_2S

C. $KMnO_4$

D. Cr_2O_3

Answer: C

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2. If chlorine is passed through a solution of hydrogen sulphide in water, the solution turns turbid due to the formation of

A. free chlorine

B. free sulphur

C. nascent oxygen

D. nascent hydrogen

Answer: B

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3. A balck powder when heated with Conc. HCI gives a greenish yellow. Gas. The gas as an oxidising and bleaching agent. When it is passed over slake lime, a white poweder is formed which is a ready source of gas. The back powder and white powder respectively are

A. $KClO_3$ and $NaClO_3$

B. MnO_2 and $Ca(OCl)_2$

C. MnO_2 and $KClO_3$

D. $MnCl_4$ and $COCl_2$

Answer: B

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4. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	H_2SO_4	(i)	Highest electron gain enthalpy
(B)	CCl_3NO_2	(ii)	Chalcogen
(C)	Cl_2	(iii)	Tear gas
(D)	Sulphur	(iv)	Storage batteries

A. $(A) \rightarrow (iv), (B) \rightarrow (iii), (C) \rightarrow (i), (D) \rightarrow (ii)$

B. $(A) \rightarrow (iii), (B) \rightarrow (iv), (C) \rightarrow (i), (D) \rightarrow (ii)$

C. $(A) \rightarrow (iv), (B) \rightarrow (i), (C) \rightarrow (ii), (D) \rightarrow (iii)$

D. $(A) \rightarrow (ii), (B) \rightarrow (i), (C) \rightarrow (iii), (D) \rightarrow (iv)$

Answer: A

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Hydrogen Chloride

1. HCl can be prepared by

A. $NaCl + H_2SO_4 \xrightarrow{420K}$

B. $NaHSO_4 + NaCl \xrightarrow{820K}$

C. $NaNO_3 + H_2SO_4$

D. both (a) and (b).

Answer: D

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2. When three parts of cone. HCl and one part of cone. HNO_3 is mixed, a compound 'X' is formed. The correct option related to 'X' is

A. 'X' is known as aqua-regia

B. 'X' is used for dissolving gold

C. 'X' is used for decomposition of salts of weaker acids

D. both (a) and (b).

Answer: D

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Oxoacids Of Halogens

1. The correct order of acidity of oxoacids of halogens is

A. $HClO < HClO_2 < HClO_3 < HClO_4$

B. $HClO_4 < HClO_3 < HClO_2 < HClO$

C. $HClO < HClO_4 < HClO_3 < HClO_2$

D. $HClO_4 < HClO_2 < HClO_3 < HClO$

Answer: A

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2. The following acids have been arranged in order of decreasing acid strength. Identify the correct order.

ClOH (I) , BrOH (II) , IOH(III)

A. $I > II > III$

B. $II > I > III$

C. $III > II > I$

D. $I > III > II$

Answer: A

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3. Which of the following increasing order is not correct as mentioned in the property with it?

A. $HClO < HClO_2 < HClO_3 < HClO_4$ (thermal stability)

B. $HClO_4 < HClO_3 < HClO_2 < HClO$ (oxidising power)

C. $F^- < Cl^- < Br^- < I^-$ (reducing nature)

D. $HIO_4 < ICl < I_2 < HI$ (oxidation number of iodine)

Answer: D

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Interhalogen Compounds

1. Interhalogen compounds are more reactive than the individual halogens because

A. they are prepared by direct combination of halogens

B. X-X' bond is weaker than X-X or X' -X' bonds

C. they are thermally more stable than halogens

D. there is a large difference in their electronegativity.

Answer: B

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2. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	ClF_3	(i)	Pentagonal bipyramidal
(B)	IF_5	(ii)	Square pyramidal
(C)	IF_7	(iii)	Bent T-shaped
(D)	BrF_3	(iv)	Square planar

A. $(A) \rightarrow (iii), (B) \rightarrow (i), (C) \rightarrow (iv), (D) \rightarrow (ii)$

B. $(A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iii), (D) \rightarrow (iv)$

C. $(A) \rightarrow (ii), (B) \rightarrow (iv), (C) \rightarrow (iii), (D) \rightarrow (i)$

D. $(A) \rightarrow (iii), (B) \rightarrow (ii), (C) \rightarrow (i), (D) \rightarrow (iii)$

Answer: D

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Group 18 Elements The Noble Gases

1. Xenon has closed shell configuration but is known to give compounds with fluorine because

A. Xe atom has large size and lower ionisation potential as compared to other noble gases

B. Xe has unpaired electrons which can form covalent bonds

C. Xe has highest boiling point hence it can form compounds with fluorine

D. fluorine is the smallest element hence it can react with all noble gases.

Answer: A

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2. Which compound is prepared by the following reaction ?

$$\underset{(\text{2:1 volume ratio})}{Xe + F_2} \xrightarrow[673K]{Ni}$$

A. XeF_4

B. XeF_2

C. XeF_6

D. None of these.

Answer: B

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3. Which of the following statements is not correct about XeF_2?

A. It can be obtained by direct reaction between F_2 and Xe at high pressure.

B. XeF_2 undergoes alkaline hydrolysis to give O_2 and Xe.

C. XeF_2 is a powerful oxidising agent.

D. XeF_2 contains two bond pairs and three lone pairs.

Answer: C

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4. In the clathrates of xenon with water the nature of bonding in Xe and H_2O molecule is

A. covalent

B. hydrogen bonding

C. coordinate

D. dipole-induced dipole.

Answer: D

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5. Complete the following reactions by filling the appropriate choice.

$A.\ 6XeF_4 + 12H_2O \rightarrow 4Xe + 2XeO_3 + (i) + (ii)$

$B.\ XeF_6 + 3H_2O \rightarrow (iii) + 6HF$

A. (i) (ii) (iii)
F_2 H_2O $XeOF_4$

B. (i) (ii) (iii)
$24HF$ $3O_2$ XeO_3

C. (i) (ii) (iii)
$2HF$ $2H_2O$ XeO

D. (i) (ii) (iii)
HF H_2O Xe_2O_3

Answer: B

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6. Among the following molecules

$(i) XeO_3 (ii) XeOF_4 (iii) XeF_6$

those having same number of lone pairs on Xe are

A. (i) and (ii) only

B. (i) and (iii) only

C. (ii) and (iii) only

D. (i), (ii) and (iii)

Answer: D

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7. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	XeF_4	(i)	sp^3d^2
(B)	XeF_6	(ii)	sp^3d^3
(C)	$XeOF_2$	(iii)	sp^3d
(D)	XeO_3	(iv)	sp^3

A. $(A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iii), (D) \rightarrow (iv)$

B. $(A) \rightarrow (iv), (B) \rightarrow (iii), (C) \rightarrow (ii), (D) \rightarrow (i)$

C. $(A) \rightarrow (iii), (B) \rightarrow (iv), (C) \rightarrow (i), (D) \rightarrow (ii)$

D. $(A) \rightarrow (ii), (B) \rightarrow (iii), (C) \rightarrow (iv), (D) \rightarrow (i)$

Answer: A

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8. Match the list of noble gas compounds in column I with their shapes in column II and mark the appropriate choice.

Column I		Column II	
(A)	XeF_4	(i)	Distorted octahedral
(B)	XeF_6	(ii)	Tetrahedral
(C)	XeO_3	(iii)	Square planar
(D)	XeO_4	(iv)	Trigonal pyramidal

A. $(A) \rightarrow (iv), (B) \rightarrow (iii), (C) \rightarrow (ii), (D) \rightarrow (i)$

B. $(A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iii), (D) \rightarrow (iv)$

C. $(A) \rightarrow (ii), (B) \rightarrow (iii), (C) \rightarrow (iv), (D) \rightarrow (i)$

D. $(A) \rightarrow (iii), (B) \rightarrow (i), (C) \rightarrow (iv), (D) \rightarrow (ii)$

Answer: D

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9. In XeF_2, XeF_4 and XeF_6, the number of the lone pairs of Xe respectively are

A. 2, 3, 1

B. 1,2,3

C. 4, l, 2

D. 3, 2, 1

Answer: D

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10. Oganesson has been synthetically produced by collision of

A. Ra and Ca

B. Cf and Ca

C. Cf and Cu

D. Ra and He

Answer: B

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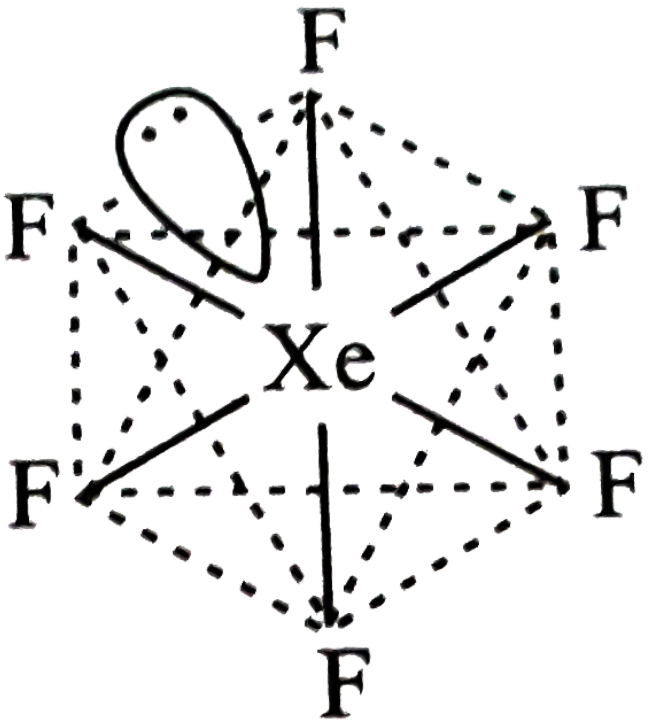
11. Which of the following is not correct about xenon hexafluoride?



A. It has oxidation state of +6.

B. The hybridisation involved in XeF_6 is sp^3d^3

C. The shape of XeF_6 is distorted octahedral and can be represented as

D. On hydrolysis it gives Xe, HF and O_2.

Answer: D

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12. Fill in the blanks by choosing the appropriate option. The noble gases can form compounds with (i) and (ii) . The mixture of (iii) and (iv) is used for respiration by divers.

A.

(i)	(ii)	(iii)	(iv)
iodine	oxygen	oxygen	argon

B.

(i)	(ii)	(iii)	(iv)
fluorine	oxygen	helium	oxygen

C.

(i)	(ii)	(iii)	(iv)
xenon	platinum	argon	krypton

D.

(i)	(ii)	(iii)	(iv)
helium	oxygen	xenon	argon

Answer: B

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13. Which of the following is not a use of noble gases?

A. Argon is widely used for filling incandescent electric bulbs.

B. Neon is used in safety devices for protecting electrical instruments.

C. Radon is used in radiotherapy of cancer.

D. Helium is filled in tubes of cycles and scooters tyres.

Answer: D

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14. Which of the following statements is not correct?

A. Helium has the lowest boiling point among the noble gases

B. Argon is used in electric bulbs

C. Krypton is obtained during radioactive disintegration

D. $Xe \quad \text{forms} \quad XeF_6$.

Answer: C

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Higher Order Thinking Skills

1. White phosphorus reacts with chlorine and the product hydrolyses in the presence of water. Calcualte the mass of HCl obtained by the hydrolysis of the product formed by the reaction

of 62 g of white phosphorus with chlorine in the presence of water.

A. 200 g

B. 400 g

C. 219 g

D. 100 g

Answer: C

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2. Oxyacids of phosphorous and the starting materials for their preparation are given below.

	Ocyacid		Matereifal for preparation
(A)	H_3PO_2	(i)	$\text{Red P} + \text{alpali}$
(B)	H_3P_3	(ii)	$P_4O_{10} + H_2O$
(C)	H_3PO_4	(iii)	$P_2O_3 + H_2O$
(D)	$H_4P_2O_6$	(iv)	$\text{White P} + \text{alkali}$

Choose the correct answer from the codes given below:

A. (A) - (iv), (B) - (iii), (C) - (ii), (D) - (i)

B. (A) - (i), (B) - (iii), (C) - (ii), (D) - (iv)

C. (A) - (iv), (B) - (iii), (C) - (i), (D) - (ii)

D. (A) - (ii), (B) - (iii), (C) - (i), (D) - (iv)

Answer: A

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3. Which of the following statements are incorrect ?

A. SO_3 is a stronger oxidising agent and more acidic than SO_2

.

B. Selenium forms only two oxoacids i.e., selenous acid (H_2SeO_3) and selenic acid (H_2SeO_4).

C. The acidic strength and oxidising power of oxoacids is greater in +6 oxidation state than in +4 oxidation state.

D. The thermal stability of oxides of group 16 elements decreases in the order : $SO_2 > SeO_2 > TeO_2 > PoO_2$

Answer: D

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4. Consider the following substances :

1. OF_2 2. Cl_2O 3. Br_2O

The correct sequence X - O - X bond angle is

A. $1 > 2 > 3$

B. $3 > 2 > 1$

C. $2 > 1 > 3$

D. $1 > 3 > 2$

Answer: B

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5. The reactions of CI_2 gas with cold-dilute and hot-concentrated NaOH in water give sodium salts of two different oxioacids of chlorine, P and Q, respectively. The CI_2 gas reacts with SO_2 gas, in presence of charocal, to give a product R reacts with white phosphorus to give a compound S. On hydrolysis, S gives an

oxoacid of phosphorus.

R, S and T, respectively, are

A. SO_2Cl_2, PCl_5 and H_3PO_4

B. SO_2Cl_2, PCl_3 and H_3PO_3

C. $SOCl_2, PCl_3$ and H_3PO_2

D. $SOCl_2, PCl_5$ and H_3PO_4

Answer: A

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6. The reactions of CI_2 gas with cold-dilute and hot-concentrated NaOH in water give sodium salts of two different oxioacids of chlorine, P and Q, respectively. The CI_2 gas reacts with SO_2 gas, in presence of charocal, to give a product R reacts with white phosphorus to give a compound S. On hydrolysis, S gives an

oxoacid of phosphorus.

P and Q, respectively, are the sodium salts of

A. hypochlorous and chloric acids

B. hypochlorous and chlorous acids

C. chloric and perchloric acids

D. chloric and hypochlorous acids.

Answer: A

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7. Which among the following statements is incorrect?

A. 1. XeF_4 and SbF_5 combine to form salt.

B. 2. He and Ne do not form clathrates.

C. 3. He has highest boiling point in its group.

D. 4. He diffuses through rubber and polyvinyl chloride.

Answer: C

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Ncert Exemplar

1. On addition 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. 1. H_2SO_4 reduces HI to I_2

B. 2. HI is of violet colour

C. 3. HI gets oxidised to I_2

D. 4. HI changes to HIO_3.

Answer: C

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2. In qualitative analysis when H_2S is passed through an aqueous solution of salt acidified with dil. HCl, a black precipitate is obtained. On boiling the precipitate with dil. HNO_3, it forms a solution of blue colour. Addition of excess of aqueous solution of ammonia to this solution gives

A. 1. deep blue precipitate of $Cu(OH)_2$

B. 2. deep blue solution of $\left[Cu(NH_3)_4\right]^{2+}$

C. 3. deep blue solution of $Cu(NO_3)_2$

D. 4. deep blue solution of $Cu(OH)_2.\ Cu(NO_3)_2$

Answer: B

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3. In a cyclotrimetaphosphoric acid molecule, how many single and double bonds are present ?

A. 3 double bonds, 9 single bonds

B. 6 double bonds, 6 single bonds

C. 3 double bonds, 12 single bonds

D. Zero double bonds, 12 single bonds

Answer: C

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4. Which of the following elements can be involved in $p\pi - d\pi$ bonding ?

A. Carbon

B. Nitrogen

C. Phosphorus

D. Boron

Answer: C

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5. Which of the following pairs of ions are isoelectronic and isostructural?

A. CO_3^{2-}, NO_3^-

B. ClO_3^-, CO_3^{2-}

C. SO_3^{2-}, NO_3^-

D. ClO_3^-, SO_3^{2-}

Answer: A

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6. Affinity for hydrogen decreases in the group from fluorine to iodine. Which of the halogen acids should have highest bond dissociation enthalpy?

A. 1. HF

B. 2. HCl

C. 3. HBr

D. 4. HI

Answer: A

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7. Bond dissociation enthalpy of E-H (E=element) bond is given below.

Compound	NH_3	PH_3	AsH_3	SbH_3
$\Delta_{diss}(E—H)$ /kJ mol^{-1}	389	322	297	255

Which of the following compounds will act as strongest reducing agent?

A. 1. NH_3

B. 2. PH_3

C. 3. AsH_3

D. 4. SbH_3

Answer: D

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8. On heating with concentrated NaOH solution in an inert atmosphere of CO_2, white phosphorus gives a gas. Which of the following statements is incorrect about the gas ?

A. 1. It is highly poisonous and has smell like rotten fish.

B. 2. Its solution in water decomposes in the presence of light.

C. 3. It is more basic than NH_3

D. 4. It is less basic than NH_3.

Answer: C

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9. Which of the following acids forms three series of salts?

A. H_3PO_2

B. H_3BO_3

C. H_3PO_4

D. H_3PO_3

Answer: C

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10. Strong reducing behaviour of H_3PO_2 is due to

A. 1. low oxidation state of phosphorus

B. 2. presence of two - OH groups and one P-H bond

C. 3. presence of one - OH group and two P-H bonds

D. 4. high electron gain enthalpy of phosphorus.

Answer: C

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11. On heating lead nitrate forms oxides of nitrogen and lead. The oxides formed are :

A. 1. N_2O, PbO

B. 2. NO_2, PbO

C. 3. NO, PbO

D. 4. NO, PbO_2

Answer: B

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12. Which of the following elements does not show allotropy ?

A. 1. Nitrogen

B. 2. Bismuth

C. 3. Antimony

D. 4. Arsenic

Answer: B

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13. Maximum covalency of nitrogen is :

A. 3

B. 5

C. 4

D. 6

Answer: C

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14. Which of the following statements is wrong?

A. Single N-N bond is stronger than the single P-P bond.

B. PH_3 can act as a ligand in the formation of coordination compound with transition elements.

C. NO_2 is paramagnetic in nature.

D. Covalency of nitrogen in N_2O_5 is four.

Answer: A

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15. A brown ring is formed in the ring test for NO_3^- ion. It is due to the formation of

A. $\left[Fe(H_2O)_5(NO)\right]^{2+}$

B. $FeSO_4 \cdot NO_2$

C. $\left[Fe(H_2O)_4(NO)_2\right]^{2+}$

D. $FeSO_4 \cdot HNO_3$

Answer: A

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16. Elements of group 15 form compounds in $+5$ oxidatin state. However, bismuth forms only one well characterised compound in $+5$ oxidation state. The compound is

A. Bi_2O_5

B. BiF_3

C. $BiCl_5$

D. Bi_2S_5

Answer: B

View Text Solution

17. On heating ammonium dichromate and barium azide separately we get

A. N_2 in both cases

B. N_2 with ammonium dichromate and NO with barium azide

C. N_2O with ammonium dichromate and N_2 with barium azide

D. N_2O with ammonium dichromate and NO_2 with barium azide.

Answer: A

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18. In the preparation of HNO_3, we get NO gas by catalytic oxidation of ammonia . The moles of No produced by the oxidation of two moles of NH_3 will be ..... .

A. 2

B. 3

C. 4

D. 6

Answer: A

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19. The oxidation state of central atom in the anion of compound NaH_2PO_2 will be .....

A. $+3$

B. $+5$

C. $+1$

D. -3

Answer: C

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20. Which of the following is not tetrahedral in shape ?

A. NH_4^+

B. $SiCl_4$

C. SF_4

D. SO_4^{2-}

Answer: C

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21. Which of the following are peroxoacids of sulphur ?

A. H_2SO_5 and $H_2S_2O_8$

B. H_2SO_5 and $H_2S_2O_7$

C. $H_2S_2O_7$ and $H_2S_2O_8$

D. $H_2S_2O_6$ and $H_2S_2O_8$

Answer: A

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22. Hot conc. H_2SO_4 acts as moderately strong oxidising agent. It oxidises both metals and non-metals. Which of the following elements is oxidised by conc. H_2SO_4 into two gaseous products ?

A. Cu

B. S

C. C

D. Zn

Answer: C

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23. A black compound of manganese reacts with a halogen acid to give greenish yellow gas. When excess of this gas reacts with

`NH_(3) an unstable trihalide is formed. In this process the oxidation state of nitrogen changes from .....

A. -3 to $+3$

B. -3 to0

C. -3 to $+5$

D. 0 to -3

Answer: A

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24. In the preparation of compounds of Xe, Bartlett had taken $O_2^+ PtF_6^-$ as a base compound. This is because

A. both O_2 and Xe have same size

B. both O_2 and Xe have same electron gain enthalpy

C. both O_2 and Xe have almost same ionisation enthalpy

D. both Xe and O_2 are gases.

Answer: C

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25. In solid state, PCl_5 is a.....

A. covalent solid

B. octahedral structure

C. ionic solid with $[PCl_6]^+$ octahedral and $[PCl_4]^-$ tetrahedral

D. ionic solid with $[PCl_4]^+$ tetrahedral and $[PCl_6]^-$ octahedral

Answer: D

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26. Reduction potentials of some ions are given below. Arrange them in decreasing order of oxidising power.

Ion	ClO_4^-	IO_4^-	BrO_4^-
Reduction potential $E°/V$	$E°$ =1.19 V	$E°$ = 1.65 V	$E°$ = 1.74 V

A. $ClO_4^- > IO_4^- > BrO_4^-$

B. $IO_4^- > BrO_4^- > ClO_4^-$

C. $BrO_4^- > IO_4^- > ClO_4^-$

D. $BrO_4^- > ClO_4^- > IO_4^-$

Answer: C

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27. Which of the following is isoelectronic pair ?

A. ICl_2, ClO_2

B. $BrO_2^- BrF_2^+$

C. ClO_2, BrF

D. CN^-, O_3

Answer: B

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Assertion And Reason

1. Assertion : The covalence of nitrogen in N_2O_5 is 5

Reason : Nitrogen can expand its covalence beyond 4.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D

View Text Solution

2. Assertion : Catenation tendency is weaker in nitrogen.

Reason : Nitrogen exists as diatomic gas.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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3. Assertion: Ammonia acts as a ligand.

Reason : A lone pair of electrons on nitrogen can be donated to acceptor.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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4. Assertion : White phosphorus is more reactive than red phosphorus.

Reason : It readily catches fire in air to give dense white fumes of P_4O_{10}.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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5. Assertion : In trigonal bipyramidal structure two axial bonds are longer than the equatorial bonds.

Reason : Axial bonds suffer more repulsion as compared to equatorial bonds.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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6. Assertion : Acidic character of group 16 hydrides increases from H_2O to H_2Te.

Reason : Thermal stablility of hydrides decreases down the group.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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7. Assertion : Ozone layer in the upper region of atmosphere protects earth from UV radiations of sun.

Reason : Ozone is a powerful oxidising agent as compared to oxygen.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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8. Assertion : O_3 acts as a powerful oxidising agent.

Reason : O_3 oxidises lead sulphide to lead sulphate and iodide ions to iodine.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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9. Assertion: In vapour state sulphur is paramagnetic in nature.

Reason : In vapour state sulphur exists as S_2 molecule.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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10. Assertion : Sulphuric acid reacts with sodium chloride in the following way: $2NaCl + H_2SO_4 \rightarrow 2HCl + Na_2SO_4$

Reason : Sulphuric acid because of its low volatility can be used to manufacture more volatile acids from their corresponding salts.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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11. Assertion : Fluorine combines with sulphur to form SF_6 but no other halogen forms hexahalide with sulphur.

Reason : The reactivity of halogens increases as the atomic number increases.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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12. Assertion : Fluorine oxidises water to oxygen whereas chlorine and bromine react with water to form corresponding hydrohalic and hypohalous acids.

Reason : The reactivity of halogens increases down the group.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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13. Assertion: $HClO_4$ is a stronger acid than $HClO_3$.

Reason: Oxidation state of Cl in $HClO_4$ is $+VII$ and in $HClO_3 + V$.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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14. Assertion : Interhalogen compounds are more reactive than halogens (except fluorine)

Reason : They all undergo hydrolysis giving halide ion derived from the smaller halogen and anion derived from larger halogen.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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15. Assertion :Solubility of noble gases in water decreases with increases in atomic size

Reason :Solubility of noble gases in water is due to instantaneous dipole induced dipole interaction

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D

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