*QUESTION BANK ON*

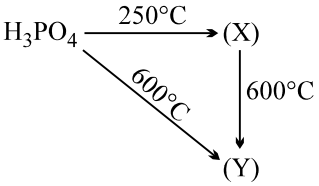
# *P-BLOCK ELEMENTS*

## ***ONLY ONE OPTION IS CORRECT***

Q.1 Which is incorrectly matched?

(A) $CsBr_3$ l $Cs^+ + Br_3^-$ (B) $I_4O_9$ l $I^{3+} + (IO_3^-)_3$

(C) $AgBrO_3$ l $Ag^+ + BrO_3^-$ (D) $I_2O_4$ l $IO_2^- + IO_2^+$

Q.2 


(A) (X) = Pyrophosphoric acid (liquid), (Y) = Metaphosphoric acid (liquid)
(B) (X) = Pyrophosphoric acid (liquid), (Y) = Metaphosphoric acid (solid)
(C) (X) = Pyrophosphoric acid (solid), (Y) = Metaphosphoric acid (solid)
(D) (X) = Pyrophosphoric acid (solid), (Y) = Metaphosphoric acid (liquid)

Q.3 $H_3PO_2 \xrightarrow{\Delta} (X) + PH_3$ ; is
(A) Dehydration reaction (B) Oxidation reaction
(C) Disproportionation reaction (D) Dephosphorelation reaction

Q.4 Which of the following species is not a pseudohalide?

(A) $CNO^-$ (B) RCOO (C) $OCN^-$ (D) $N_3^-$

Q.5 An orange solid (X) on heating, gives a colourless gas (Y) and a green residue (Z). Gas (Y) on treatement with Mg, produces a white solid substance .....
(A) $Mg_3N_2$ (B) MgO (C) $Mg_2O_3$ (D) $MgCl_2$

Q.6 Conc. $HNO_3$ is yellow coloured liquid due to
(A) dissolution of NO in conc. $HNO_3$ (B) dissolution of $NO_2$ in conc. $HNO_3$
(C) dissolution of $N_2O$ in conc. $HNO_3$ (D) dissolution of $N_2O_3$ in conc. $HNO_3$

Q.7 A gas at low temperature does not react with the most of compounds. It is almost inert and is used to create inert atmosphere in bulbs. The combustion of this gas is exceptionally an endothermic reaction. Based on the given information, we can conclude that the gas is
(A) oxygen (B) nitrogen (C) carbon mono-oxide (D) hydrogen

Q.8 When chlorine gas is passed through an aqueous solution of a potassium halide in the presence of chloroform, a voilet colouration is obtained. On passing more of chlorine water, the voilet colour is disappeared and solution becomes colourless. This test confirms the presence of ..... in aqueous solution.
(A) chlorine (B) fluorine (C) bromine (D) iodine

Q.9 $H_3PO_2 \xrightarrow{140°C} A \xrightarrow{160°C} B \xrightarrow{250°C} C \xrightarrow{316°C} D$
Compound (D) is
(A) $H_2PO_3$ (B) $H3PO_3$ (C) $HPO_3$ (D) $H_4P_2O_7$

Q.10 An explosive compound (A) reacts with water to produce $NH_4OH$ and HOCl. Then, the compound (A), is
(A) TNG (B) $NCl_3$ (C) $PCl_3$ (D) $HNO_3$

Q.11 An inorganic salt (A) is decomposed at about 523 K to give products (B) and (C). Compound (C) is a liquid at room temperature and is neutral to litmus paper while oxide (B) on burning with white phosphorous, given a dehydrating agent (D). Compounds (A), (B), (C) and (D) will be identified as
(A) $NH_4NO_3$, $N_2O$, $H_2O$, $P_2O_5$ (B) $NH_4NO_2$, $K_2O$, $H_2O$, $P_2O_5$
(C) $CaCO_3$ , CaO, $H_2O$, $CaCl_2$ (D) $CaCO_3$ , CaO, $H_2O$, $Ca(OH)_2$

Q.12 An inorganic compound (A) made of two most occuring elements into the earth crust, having a polymeric tetra-headral network structure. With carbon, compound (A) produces a poisonous gas (B) which is the most stable diatomic molecule. Compounds (A) and (B) will be
(A) $SiO_2$, $CO_2$ (B) $SiO_2$, CO (C) SiC,CO (D) $SiO_2$, $N_2$

Q.13 A sulphate of a metal (A) on heating evolves two gases (B) and (C) and an oxide (D). Gas (B) turns $K_2Cr_2O_7$ paper green while gas (C) forms a trimer in which there is no S–S bond. Compound (D) with HCI, forms a Lewis base (E) which exists as a dimer. Compounds (A), (B), (C), (D) and (E) are respectively
(A) $FeSO_4$, $SO_2$, $SO_3$, $Fe_2O_3$, $FeCl_3$ (B) $Al_2(SO_4)_3$, $SO_2$, $SO_3$, $Al_2O_3$, $FeCl_3$
(C) FeS, $SO_2$, $SO_3$, $FeSO_4$, $FeCl_3$ (D) FeS, $SO_2$, $SO_3$ , $Fe_2(PO_4)_3$, $FeCl_2$

Q.14 A tetra-atomic molecule (A) on reaction with nitrogen(I)oxide, produces two substances (B) and (C). (B) is a dehydrating agent in its monomeric form while substance (C) is a diatomic gas which shows almost inert behaviour. The substances (A) and (B) and (C) respectively will be
(A) $P_4$, $P_4O_{10}$, $N_2$ (B) $P_4$, $N_2O_5$, $N_2$ (C) $P_4$, $P_2O_3$, Ar (D) $P_4$, $P_2O_3$, $H_2$

Q.15 First compound of inert gases was prepared by scientist Neil Barthlete in 1962. This compound is
(A) $XePtF_6$ (B) $XeO_3$ (C) $XeF_6$ (D) $XeOF_4$

Q.16 Carbongene has X% of $CO_2$ and is used as an antidote for poisoning of Y . Then, X and Y are
(A) X = 95% and Y = lead poisoning (B) X = 5% and Y = CO poisoning
(C) X = 30% and Y = $CO_2$ poisoning (D) X = 45% and Y = CO poisoning

Q.17 The correct order of acidic strength of oxides of nitrogen is
(A) $NO < NO_2 < N_2O < N_2O_3 < N_2O_5$ (B) $N_2O < NO < N_2O_3 < N_2O_4 < N_2O_5$
(C) $NO < N_2O < N_2O_3 < N_2O_5 < N_2O_4$ (D) $NO < N_2O < N_2O_5 < N_2O_3 < N_2O_4$

Q.18 Nitrogen dioxide is dissolved in water to produce
(A) $HNO_3$ and $HNO_2$(B) only $HNO_3$ (C) only $HNO_2$ (D) $HNO_2$ and $N_2$

Q.19 Consider two reactions
I. Zn + conc. $HNO_3$ (hot) $\rightarrow Zn(NO_3)_2 + X + H_2O$
II. Zn + dil. $HNO_3$ (cold) $\rightarrow Zn(NO_3)_2 + Y + H_2O$
Compounds X and Y are respectively
(A) $N_2O$, NO (B) $NO_2$, $N_2O$ (C) $N_2$, $N_2O$ (D) $NO_2$, NO

Q.20 $H_3BO_3 \xrightarrow{T_1} X \xrightarrow{T_2} Y \xrightarrow{\text{red hot}} B_2O_3$
if $T_1 < T_2$ then X and Y respectively are
(A) X = Metaboric acid and Y = Tetraboric acid
(B) X = Tetraboric acid and Y = Metaboric acid
(C) X = Borax and Y = Metaboric acid
(D) X = Tetraboric acid and Y = Borax

Q.21 Boron forms $BX_3$ type of halides. The correct increasing order of Lewis-acid strength of these halides is
(A) $BF_3 > BCl_3 > BBr_3 > BI_3$ (B) $BI_3 > BBr_3 > BCl_3 > BF_3$
(C) $BF_3 > BI_3 > BCl_3 > BBr_3$ (D) $BF_3 > BCl_3 > BI_3 > BBr_3$

Q.22 Which one of the following compounds on strong heating evolves ammonia gas?
(A) $(NH_4)_2SO_4$ (B) $HNO_3$ (C) $(NH_4)_2Cr_2O_7$ (D) $NH_3NO_3$

Q.23 The compound $(SiH_3)_3N$ is expected to be
(A) pyramidal and more basic than $(CH_3)_3N$ (B) planar and less basic than $(CH_3)_3N$
(C) pyramidal and less basic than $(CH_3)_3N$ (D) planar and more basic than $(CH_3)_3N$

Q.24 The correct order of acidic strength of oxy-acids of chlorine 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) $HClO_4 < HClO_2 > HClO_3 > HClO$

Q.25 In a molecule of phosphorus (V)oxide, there are
(A) 4P–P, 10P–O and 4P=O bonds (B) 12P–O and 4P=O bonds
(C) 2P–O and 4P=P bonds (D) 6P–P, 12P–O and 4P=P bonds

Q.26 The structures of $O_3$ and $N_3^-$ are
(A) linear and bent, respectively (B) both linear
(C) both bent (D) bent and linear, respectively

Q.27 When conc. $H_2SO_4$ was treated with $K_4[Fe(CN)_6]$, CO gas was evolved. By mistake, somebody used dilute $H_2SO_4$ instead of conc. $H_2SO_4$ then the gas evolved was
(A) CO (B) HCN (C) $N_2$ (D) $CO_2$

Q.28 $\underset{\text{(organic Compound)}}{A} + O_2 \longrightarrow X + Y + Z$

Compound (A) in pure form does not give ppt. with $AgNO_3$ solution. A mixture cootaining 70% of (A) and 30% of ether is used as an anaesthetic. Compound (X) and (Y) are oxides while (Z) is a pungent smelling gas. (X) is a neutral oxide which turns cobalt chloride paper pink. Compound (Y) turns lime water milky and produces an acidic solution with water. Compounds (A), (X), (y) and (Z) respectively will be
(A) $CH_4$, $H_2O$, $CO_2$, $Cl_2$ (B) $CHCl_3$, $H_2O$, $CO_2$, $Cl_2$
(C) $CH_3OH$, $H_2O$, $CO_2$, $N_2$ (D) $NH_2CONH_2$, $H_2O$, $N_2O$, $CO_2$

Q.29 An inorganic white crystalline compound (A) has a rock salt structure. (A) on reaction with cone. $H_2SO_4$ and $MnO_2$, evolves a pungent smelling, greenish-yellow gas (B). Compound (A) gives white ppt. of (C) with $AgNO_3$ solution. Compounds (A), (B) and (C) will be respectively
(A) NaCl, $Cl_2$, AgCl (B) NaBr, $Br_2$, NaBr (C) NaCl, $Cl_2$, $Ag_2SO_4$ (D) $Na_zCO_3$, $CO_2$, $Ag_2CO_3$

Q.30 $RCl \xrightarrow[Si]{\text{cu–powder}} R_2SiCl_2 \xrightarrow{H_2O} R_2Si(OH)_2 \xrightarrow{\text{condensation}} A$

Compound (A) is
(A) a linear silicone (B) a chlorosilane (C) a linear silane (D) a network silane

Q.31 When oxalic acid reacts with cone. $H_2SO_4$, two gases produced are of neutral and acidic in nature respectively. Potassium hydroxide absorbs one of the two gases. The product formed during this absorption and the gas which gets absorbed are respectively
(A) $K_2CO_3$ and $CO_2$ (B) $KHCO_3$ and $CO_2$ (C) $K_2CO_3$ and CO (D) $KHCO_3$ and CO

Q.32 Concentrated $HNO_3$ reacts with iodine to give
(A) HI (B) HOI (C) $HOIO_2$ (D) $HOIO_3$

Q.33 Conc. $H_2SO_4$ cannot be used to prepare HBr from NaBr because it
(A) reacts slowly with NaBr (B) oxidises HBr
(C) reduces HBr (D) disproportionates HBr

Q.34 $CH_2\begin{cases}COOH\\COOH\end{cases} \xrightarrow{P_4O_{10},\,150^\circ C} X$

Compound (X) is
(A) malonic acid (B) carbon suboxide (C) tartaric acid (D) acetic acid

Q.35 Molecular shapes of $SF_4$, $CF_4$ and $XeF_4$ are
(A) the same, with 2, 0 and 1 lone pairs of electrons respectively
(B) the same, with 2, 0 and 1 lone pairs of electrons respectively
(C) the different, with 0, 1 and 2 lone pairs of electrons respectively
(D) the different, with 1, 0 and 2 lone pairs of electrons respectively

Q.36 Match List-I with List-II

| List-I | Chemical reaction | List-II | Name of process |
|---|---|---|---|
| I. | $4NH_3 + 5O_2 \xrightarrow{800°C/Pt} 4NO + 6H_2O$ | (a) | Contact process |
| II. | $4HCl + O_2 \xrightarrow[450–500°/V_2O_5]{3230°C/CuCl_2} 2Cl_2 + 2H_2O$ | (b) | Ostwald's process |
| III. | $2SO_2 + O_2 \longrightarrow 2SO_3$ | (c) | Deacon's process |
| IV. | $2N_2 + 3H_2 \xrightarrow{Fe+Mo} 2NH_3$ | (d) | Haber's proces |

(A) I-a, II-b, III-d, IV-c (B) I-b, II-c, III-a, IV-d
(C) I-a, II-d, III-c, IV-b (D) I-a, II-c, III-b, IV-d

Q.37 Ammonia can be dried by
(A) conc. $H_2SO_4$ (B) $P_4O_{10}$ (C) CaO (D) anhydrous $CaCl_2$

Q.38 When chlorine reacts with a gas X, an explosive inorganic compound Y is formed. Then X and Y will be
(A) X = $O_2$ and Y = $NCl_3$ (B) X = $N_2$ and Y=$NCl_3$
(C) X = $O_2$ and Y = $NH_4NO_3$ (D) X = $N_2$ and Y = $NH_4NO_3$

Q.39 The solubility of anhydrous $AlCl_3$ and hydrous $AlCl_3$ in diethyl ether are $S_1$ and $S_2$ respectively. Then
(A) $S_1 = S_2$ (B) $S_1 > S_2$ (C) $S_1 < S_2$ (D) $S_1 < S_1$ but not $S_1 = S_2$

Q.40 Which one of the following statements is not true regarding diborane?
(A) It has two bridging hydrogenes and four perpendicular to the rest.
(B) When methylated, the product is $Me_4B_2H_2$.
(C) The bridging hydrogenes are in a plane perpendicular to the rest.
(D) All the B–H bond distances are equal.

Q.41 When $AgNO_3$ is heated strongly, the products formed are
(A) NO and $NO_2$ (B) $NO_2$ and $O_2$ (C) $NO_2$ and $N_2O$ (D) NO and $O_2$

Q.42 $HNO_3 + P_4O_{10} \longrightarrow HPO_3 + A$ ; the product A is
(A) $N_2O$ (B) $N_2O_3$ (C) $NO_2$ (D) $N_2O_5$

Q.43 Which of the following is the correct order of acidic strength?
(A) $Cl_2O_7 > SO_2 > P_4O_{10}$ (B) $CO_2 > N_2O_5 > SO_3$
(C) $Na_2O > MgO > Al_2O_3$ (D) $K_2O > CaO > MgO$

Q.44 $Ca + C_2 \longrightarrow CaC_2 \xrightarrow{N_2} A$
Compound (A) is used as a/an
(A) fertilizer (B) dehydrating agent (C) oxidising agent (D) reducing agent

Q.45 A gas which exists in three allotropic forms $\alpha$, $\beta$ and $\gamma$ is
(A) $SO_2$ (B) $SO_3$ (C) $CO_2$ (D) $NH_3$

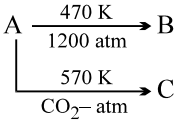
Q.46 A red coloured mixed oxide (X) on treatment with cone. $HNO_3$ gives a compound (Y). (Y) with HCl, produces a chloride compound (Z) which can also be produced by treating (X) with cone. HCl. Compounds (X), (Y), and (Z) will be
(A) $Mn_3O_4$, $MnO_2$, $MnCl_2$ (B) $Pb_3O_4$, $PbO_2$, $PbCl_2$
(C) $Fe_3O_4$, $Fe_2O_3$, $FeCl_2$ (D) $Fe_3O_4$, $Fe_2O_3$, $FeCl_3$

Q.47 There is no S–S bond in
(A) $S_2O_4^{2-}$ (B) $S_2O_5^{2-}$ (C) $S_2O_3^{2-}$ (D) $S_2O_7^{2-}$

Q.48 One mole of caleium phosphide on reaction with excess of water gives
(A) one mole of phosphine (B) two moles of phosphoric acid
(C) two moles of phosphine (D) one mole of phosphorus penta-oxide

Q.49 $NaH_2PO_4 \xrightarrow{230°C} Na_2(P_3O_9) \xrightarrow{638°C} (NaPO_3)_n \longrightarrow$ D (glossy solid)
Compound (D) is sodium hexametaphosphate which is known as
(A) Bunsen's salt (B) Graham's salt (C) Reimann's salt (D) Werner's salt

Q.50 Three allotropes (A), (B) and (C) of phoiphorous in the following change are respectively



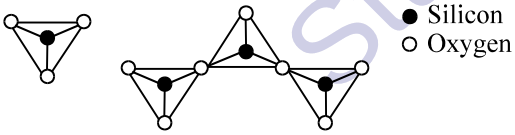

(A) white, black, red (B) black, white, red (C) red, black, white (D) red, violet, black

Q.51 When an inorganic compound reacts with $SO_2$ in aqueous medium, produces (A). (A) on reaction with $Na_2CO_3$, gives compound (B) which with sulphur, gives a substance (C) used in photography. Compound (C) is
(A) $Na_2S$ (B) $Na_2S_2O_7$ (C) $Na_2SO_4$ (D) $Na_2S_2O_3$

Q.52 Borax is actually made of two tetrahedra and two triangular units joined together and should be written as: $Na_2[B_4O_5(OH)_4]\cdot 8H_2O$
Consider the following statements about borax:
a. Each boron atom has four B–O bonds
b. Each boron atom has three B–O bonds
c. Two boron atoms have four B–O bonds while other two have three B–O bonds
d. Each boron atom has one –OH groups
Select correct statement(s):
(A) a, b (B) b, c (C) c, d (D) a, c

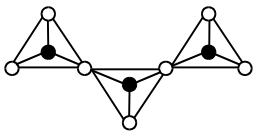
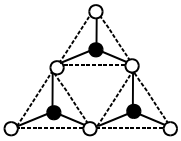
***Question No. 53 to 55 (3 questions)***
Read the following short write-up and answer the questions at the end of it
The name **'silica'** covers an entire group of minerals, which have the general formula $SiO_2$, the most common of which is **quartz**. Quartz is a framework silicate with $SiO_4$ tetrahedra arranged in spirals. The spirals can turn in a clockwise or anticlockwise direction – a feature that results in there being two mirror images, optically active, varieties of quartz.

Q.53 The following pictures represent various silicate anions. Their formulae are respectively:




(A) $SiO_3^{2-}$ $Si_3O_7^{2-}$ (B) $SiO_4^{4-}$ $Si_3O_{10}^{8-}$
(C) $SiO_4^{2-}$ $Si_3O_9^{2-}$ (D) $SiO_3^{4-}$ $Si_3O_7^{8-}$

Q.54 $Si_3O_9^{6-}$ (having three tetrahedral) is represented as:

(A)  (B) 
(C) both (D) none

Q.55 The silicate anion in the mineral kinoite is a chain of three $SiO_4$ tetrahedra that share corners with adjacent tetrahedra. The mineral also contains $Ca^{2+}$ ions, $Cu^{2+}$ ions, and water molecules in a 1:1:1 ratio mineral is represented as:
(A) $CaCuSi_3O_{10}\cdot H_2O$ (B) $CaCuSi_3O_{10}\cdot 2H_2O$
(C) $Ca_2Cu_2Si_3O_{10}\cdot 2H_2O$ (D) none of these

***Question No. 56 to 57 (2 questions)***

Questions given below are based on electronic configurations of the elements. The three elements X, Y and Z with the electronic configurations shown below all form hydrides:

| Element | Electronic configuration |
|---|---|
| X | $1s^2, 2s^2, 2p^2$ |
| Y | $1s^2, 2s^2, 2p^6, 3s^1$ |
| Z | $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}, 4s^2, 4p^5$ |

Q.56 Which line of properties (A, B, C, or D) correctly lists properties of the hydrides of these elements?

| | Hydride of X | Hydride of Y | Hydride of Z |
|---|---|---|---|
| (A) | Colourless gas insoluble in $H_2O$ | Silver/grey solid, reacts with $H_2O$ to form an alkaline solution | Colourless gas form a strong acid in $H_2O$ |
| (B) | Colourless liquid, no reaction with $H_2O$ | Silver/grey solid, forms $H_2O$ | Ionic solid with formula ZH |
| (C) | Colourless gas found naturally | Does not conduct electricity in the molten state | Colourless gas, reacts with $Cl_2$ |
| (D) | Non-polar compound reacts with $Cl_2$ in light | Silver/grey ionic solid with formula $YH_2$ | Forms when water is added to phosphorus and element Z |

Q.57 Which of the following exists as gas?

(A) $X_2$ (B) $Y_2$ (C) $Z_2$ (D) all of the above

***Question No. 58 to 59 (2 questions)***

Read the following write-ups and answer the questions at the end of it.

Silicons are synthetic polymers containing repreated $R_2SiO$ units. Since, the empirical formula is that of a ketone ($R_2CO$), the name silicone has been given to these materials. Silicones can be made into oils, rubbery elastomers and resins. They find a variety of applications because of their chemical inertness, water repelling nature, heat-resistance and good electrical insulating property.

Commercial silicon polymers are usually methyl derivatives and to a lesser extent phenyl derivatives and are synthesised by the hydrolysis of

$R_2SiCl_2$[R=methyl (Me) or phenyl ($\phi$)]

$$Me_2SiCl_2 \xrightarrow{H_2O} O-\underset{\underset{Me}{|}}{\overset{\overset{Me}{|}}{Si}}-O-\underset{\underset{Me}{|}}{\overset{\overset{Me}{|}}{Si}}-O-\underset{\underset{Me}{|}}{\overset{\overset{Me}{|}}{Si}}-O-$$

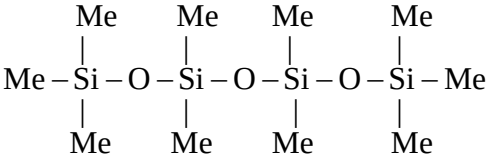
Q.58 If we mix $SiMe_3Cl$ with $SiMe_2Cl_2$, we get silicones of the type:

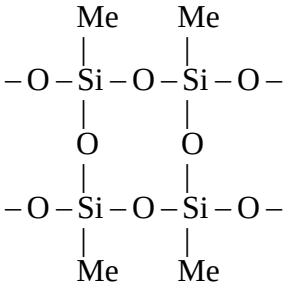
(A) $Me-\underset{\underset{Me}{|}}{\overset{\overset{Me}{|}}{Si}}-O-\underset{\underset{Me}{|}}{\overset{\overset{Me}{|}}{Si}}-O-\underset{\underset{Me}{|}}{\overset{\overset{Me}{|}}{Si}}-O-\underset{\underset{Me}{|}}{\overset{\overset{Me}{|}}{Si}}-Me$

(B) $-O-\underset{\underset{O}{|}}{\overset{\overset{Me}{|}}{Si}}-O-\underset{\underset{O}{|}}{\overset{\overset{Me}{|}}{Si}}-O-$
$-O-\underset{\underset{Me}{|}}{\overset{\overset{O}{|}}{Si}}-O-\underset{\underset{Me}{|}}{\overset{\overset{O}{|}}{Si}}-O-$

(C) both of the above (D) none of the above

Q.59 If we start with $SiMeCl_3$ as the starting material, silicones formed is:

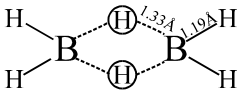
(A) 

(B) 

(C) both of the above

(D) none of the above

Q.60 The molecular shapes of diborane is shown:



Consider the following statements for diborane:

1. Boron is approximately $sp^3$ hybridised
2. B–H–B angle is 180°
3. There are two terminal B–H bonds for each boron atom
4. There are only 12 bonding electrons available

Of these statements:

(A) 1, 3 and 4 are correct

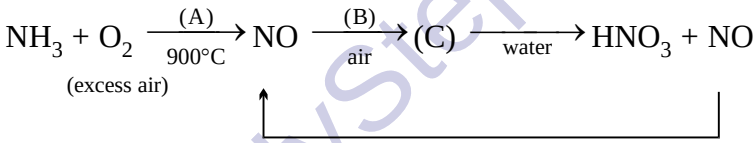
(B) 1, 2 and 3 are correct

(C) 2, 3 and 4 are correct

(D) 1, 2 and 4 are correct

***Question No. 61 to 62 (2 questions)***

The following flow diagram represents the industrial preparation of nitric acid from ammonia:



Answer the questions given below:

Q.61 Which line of entry describes the undefined reagents, products and reaction conditions?

| | A | B | C |
|---|---|---|---|
| (A) | catalyst | cool (–25°C) | $NO_2$ |
| (B) | catalyst | cool (–25°C) | $N_2O$ |
| (C) | catalyst | high pressure | $NO_2$ |
| (D) | high pressure | catalyst | $N_2O_3$ |

Q.62 Formation of $HNO_3$ when (C) is dissolved in $H_2O$ takes place through various reactions. Select the reaction not observed in this step.

(A) $NO_2 + H_2O \longrightarrow HNO_3 + HNO_2$

(B) $HNO_2 \longrightarrow H_2O + NO + NO_2$

(C) $NO_2 + H_2O \longrightarrow HNO_3 + NO$

(D) none of these

***Question No. 63 to 70 (8 questions)***

Questions given below consist of two statements each printed as Assertion (A) and Reason (R); while answering these questions you are required to choose any one of the following four responses:

(A) if both (A) and (R) are true and (R) is the correct explanation of (A)

(B) if both (A) and (R) are true but (R) is not correct explanation of (A)

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

(D) if (A) is false and (R) is true

Q.63 **Assertion :** Borax bead test is applicable only to coloured salt.
**Reason :** In borax bead test, coloured salts are decomposed to give coloured metal meta borates.

Q.64 **Assertion :** Aluminium and zinc metal evolve $H_2$ gas from NaOH solution
**Reason :** Several non-metals such as P, S, Cl, etc. yield a hydride instead of $H_2$ gas from NaOH

Q.65 **Assertion :** Conc. $H_2SO_4$ can not be used to prepare pure HBr from NaBr
**Reason :** It reacts slowly with NaBr.

Q.66 **Assertion :** Oxygen is more electronegative than sulphur, yet $H_2S$ is acidic, while $H_2O$ is neutral.
**Reason :** H–S bond is weaker than O–H bond.

Q.67 **Assertion :** $Al(OH)_3$ is amphoteric in nature.
**Reason :** It can not be used as an antacid.

Q.68 **Assertion :** Chlorine gas disproportionates in hot & conc. NaOH solution.
**Reason :** NaCl and NaOCl are formed in the above reaction.

Q.69 **Assertion :** Silicones are very inert polymers.
**Reason :** Both Si–O and Si–C bond energies are very high.

Q.70 **Assertion :** Liquid $IF_5$ conducts electricity.

**Reason :** Liquid $IF_5$ self ionizes as, $2IF_5 \rightleftharpoons IF_4^+ + IF_6^-$

## ***ONE OR MORE THAN ONE OPTION MAY BE CORRECT***

Q.1 When a compound X reacts with ozone in aqueous medium, a compound Y is produced. Ozone also reacts with Y and produces compound Z. Z acts as an oxidising agent, then X, Y and Z will be
(A) X = HI, Y = $I_2$ and Z = $HIO_3$ (B) X = KI, Y = $I_2$ and Z = $HIO_3$
(C) X = KI, Y = $I_2$ and Z = $HIO_4$ (D) X = HI, Y = $I_2$ and Z = $HIO_4$

Q.2 Which of the following statements is/are correct regarding $B_2H_6$?
(A) banana bonds are longer but stronger than normal B–H bonds
(B) $B_2H_6$ is also known as 3c–2e compound
(C) the hybrid state of B in $B_2H_6$ is $sp^3$ while that of $sp^2$ in $BH_3$
(D) it cannot be prepared by reacting $BF_3$ with $LiBH_3$ in the presence of dry ether

Q.3 Which of the following pairs of nitrates gives the same gaseous products on thermal decomposition?
(A) $KNO_3$ and $Pb(NO_3)_2$ (B) $KNO_3$ and $NaNO_3$
(C) $Pb(NO_3)_2$ and $Cu(NO_3)_2$ (D) $NaNO_3$ and $Ca(NO_3)_2$

Q.4 $2NO_2$ l $N_2O_4$The dimerisation of $NO_2$ is accompanied with
(A) decrease in paramagnetism (B) change in colour
(C) increase in temperature' (D) increase in paramagnetism

Q.5 $C(OH)_4$ is unstable because a carbon atom cannot hold more than one –OH groups but $Si(OH)_4$ is a stable compound because
(A) C–O bond energy is low (B) C–O bond energy is high
(C) Si-O bond energy is low (D) Si-O bond energy is high

Q.6 Which of the following statements is/are correct regarding inter-halogen compounds of ABx types?
(A) x may be 1,3,5 and 7
(B) A is a more electronegative halogen than B
(C) $FBr_3$ cannot exit
(D) the structures of $ClF_3$ and $IF_7$ show deviation from normal structures and could be explained on the basis of VSEPR theory

Q.7 When an inorganic compound (X) having 3e-2e as well as 2e-2e bonds reacts with ammonia gas at a certain temperature, gives a compound (Y) iso-structural with benzene. Compound (X) with ammonia at a high temperature, produces a hard substance (Z). Then
(A) (X) is $B_2H_6$ (B) (Z) is known as inorganic graphite
(C) (Z) having structure similar to graphite (D) (Z) having structure similar to (X)

Q.8 Boric acid
(A) exists in polymeric form due to inter-molecular hydrogen bonding.
(B) is used in manufacturing of optical glasses.
(C) is a tri-basic acid
(D) with borax, it is used in the preparation of a buffer solution.

Q.9 The correct statement(s) related to allotropes of carbon is/are
(A) graphite is the most stable allotropes of carbon and having a two dimensional sheet like structure of hexagonal rings of carbon ($sp^2$)
(B) diamond is the hardest allotrope of carbon and having a three dimensional network structure of C($sp^3$)
(C) fullerene ($C_{60}$) is recently discovered non-crystalline allotrope of carbon having a football-like structure.
(D) Vander Waal's force of attraction acts between the layers of graphite 6.14 Å away from each other

Q.10 $Al_2(SO_4)_3 + NH_4OH \longrightarrow X$, then
(A) X is a white coloured compound
(B) X is insoluble in excess of $NH_4OH$
(C) X is soluble in NaOH
(D) X cannot be used as an antacid

Q.11 The hybrid states of phosphorous atoms in each $PCl_5$ and $PBr_3$ in gaseous phase are $sp^3d$. But, in solid $PCl_5$, phosphorous shows $sp^3d^2$ and $sp^3$ hybrid states. While, P in $PBr_5$ is in $Sp^3$ hybrid state. This is because
(A) $PCl_5$ in solid form exists as $[PCI_6]^-[PCl_4]^+$
(B) $PBr_5$ in solid form exists as $[PCI_4]^+[PBr_6]^-$
(C) $PCl_5$ in solid form exists as $[PCI_4]^+Cl^-$
(D) $PBr_5$ in solid form exists as $[PBr_4]^+Br^-$

Q.12 The species that undergo(es) disproportionation in an alkaline medium is/are
(A) $Cl_2$ (B) $MnO_4^{2-}$ (C) $NO_2$ (D) $ClO_4^-$

Q.13 Select correct statement(s):
(A) Borax is used as a buffer
(B) 1 M borax solution reacts with equal volumes of 2 M HCl solution
(C) Titration of borax can be made using methyl orange as the indicator
(D) Coloured bead obtained in borax-bead test contains metaborate

Q.14 Select correct statement about $B_2H_6$
(A) Bridging groups are electron-deficient with 12 valence electrons
(B) It has 2c - 2e B–H bonds
(C) It has 3c - 2e B–H–B bonds
(D) All of above are correct statements

Q.15 Which of the following is / are correct for group 14 elements?
(A) The stability of dihalides are in the order $CX_2 < SiX_2 < GeX_2 < SnX_2 < PbX_2$
(B) The ability to form pπ–pπ multiple bonds among themselves increases down the group
(C) The tendency for catenation decreases down the group
(D) They all form oxides with the formula $MO_2$.

# ANSWER KEY

## ***ONLY ONE OPTION IS CORRECT***

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q.1 | D | Q.2 | B | Q.3 | C | Q.4 | B | Q.5 | A | Q.6 | B | Q.7 | B |
| Q.8 | D | Q.9 | C | Q.10 | B | Q.11 | A | Q.12 | B | Q.13 | A | Q.14 | A |
| Q.15 | A | Q.16 | B | Q.17 | B | Q.18 | A | Q.19 | B | Q.20 | A | Q.21 | B |
| Q.22 | A | Q.23 | B | Q.24 | A | Q.25 | B | Q.26 | D | Q.27 | B | Q.28 | B |
| Q.29 | A | Q.30 | A | Q.31 | A | Q.32 | C | Q.33 | B | Q.34 | B | Q.35 | D |
| Q.36 | B | Q.37 | C | Q.38 | B | Q.39 | B | Q.40 | D | Q.41 | B | Q.42 | D |
| Q.43 | A | Q.44 | A | Q.45 | B | Q.46 | B | Q.47 | D | Q.48 | C | Q.49 | B |
| Q.50 | A | Q.51 | D | Q.52 | C | Q.53 | B | Q.54 | B | Q.55 | C | Q.56 | A |
| Q.57 | C | Q.58 | A | Q.59 | B | Q.60 | A | Q.61 | A | Q.62 | D | Q.63 | A |
| Q.64 | B | Q.65 | C | Q.66 | A | Q.67 | C | Q.68 | C | Q.69 | A | Q.70 | A |

## ***ONE OR MORE THAN ONE OPTION MAY BE CORRECT***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Q.1 | A,B | Q.2 | A,B,C | Q.3 | B,C | Q.4 | A,B |
| Q.5 | A,D | Q.6 | A,C | Q.7 | A,B,C | Q.8 | A,B,D |
| Q.9 | A,B | Q.10 | A,B,C | Q.11 | A,D | Q.12 | A,C |
| Q.13 | A,B,C,D | Q.14 | B,C | Q.15 | A,C,D | | |