Order of I.E

B Al Ga In Tl

B > Tl > Ga > Al > In

due to poss. E of 4f subshell

due to poss. E of 3d subshell

Ordering size

B Al Ga In Tl

B < Al > Ga < In < Tl

≠

↓

due to poor

Sieg 3d Subshell

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P-BLOCK

2019

1. The correct statement about ICl_5 and ICl_4^- is :

(A) both are is isostructural.

(B) ICl_5 is trigonal bipyramidal and ICl_4^- is tetrahedral.

(C) ICl_5 is square pyramidal and ICl_4^- is tetrahedral.

(D) ICl_5 is square pyramidal and ICl_4^- is square planar.

P-BLOCK

2. The ion that has sp^3d^2 hydridization for the central atom, is:

(A) $[ICl_4]^-$ (B) $[ICl_2]^-$ (C) $[IF_6]^-$ (D) $[BrF_2]^-$

$4 + 2 = sp^3d^2$

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P-BLOCK

3. The correct order of the oxidation states of nitrogen in NO, N_2O, NO_2 and N_2O_3 is:

(A) $NO_2 < NO < N_2O_3 < N_2O$

(B) $NO_2 < N_2O_3 < NO < N_2O$

(C) $N_2O < N_2O_3 < NO < NO_2$

(D) $N_2O < NO < N_2O_3 < NO_2$

+1 +2 +3 +4

+2 +1 +4 +3

NO N_2O NO_2 N_2O_3

P-BLOCK

4. C_{60}, an allotrope of carbon cantains:

(A) 12 hexagons and 20 pentagons.
(B) 18 hexagons and 14 pentagons.
(C) 16 hexagons and 16 pentagons.
(D) 20 hexagons and 12 pentagons.

C_{60}

12 Pentagonal Ring — fix
20 Hexagonal gonal Rings.

Ans find the total number of Hexagonal Rings in C_{60}

$\frac{80}{2} = n + 10$

$n = 30$

$\frac{q}{2} = (n + 10)$

q = total no of Carbon atom
n = no of Hexagonal Rings

P-BLOCK

5. HF has highest boiling point among hydrogen halides, because it has:

(A) strongest van der Waals' interactions

(B) lowest ionic character

(C) strongest hydrogen bonding

(D) lowest dissociation enthalpy

HF > HI > HBr > HCl

* due to strong H-Bond

Que ★ PYQs When B_2H_6 React with independently with O_2 and H_2O then

(1) B_2O_3 H_3BO_3 (2) HBO_2 H_3BO_3 (3) H_3BO_3, B_2O_3 (4) BO_2^-, $[BH_4]^+$

$B_2H_6 + O_2 \rightarrow B_2O_3 + H_2O$

$B_2H_6 + H_2O \rightarrow H_3BO_3 + H_2$

P-BLOCK

6. The amorphous form of silica is:

(A) Tridymite (B) Kieselguhr (C) Cristobalite (D) Quartz

Amorphous form

Other crystalline solid

P-BLOCK

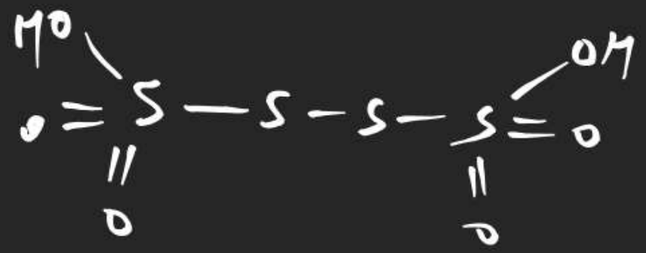
7. The oxoacid of Sulphur that does not contain bond between Sulphur atoms is :

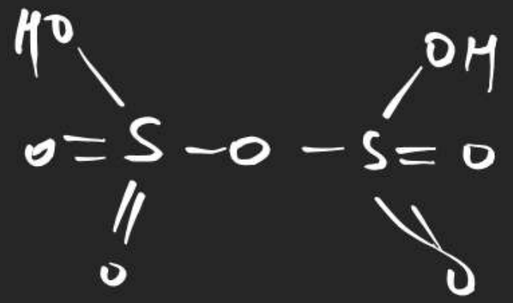
(A) $H_2S_4O_6$ (B) $H_2S_2O_3$ (C) $H_2S_2O_7$ (D) $H_2S_2O_4$

Oleum (Pyrosulphuric acid)

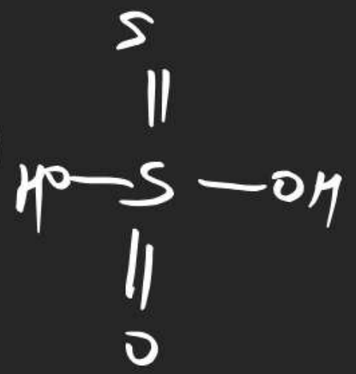
Dithionous acid

(a)





(B)



P-BLOCK

8. The correct order of catenation is :

(A) $C > Sn > Si \approx Ge$

(B) $C > Si > Ge \approx Sn$

(C) $Si > Sn > C > Ge$

(D) $Ge > Sn > Si > C$

C

Si

Ge

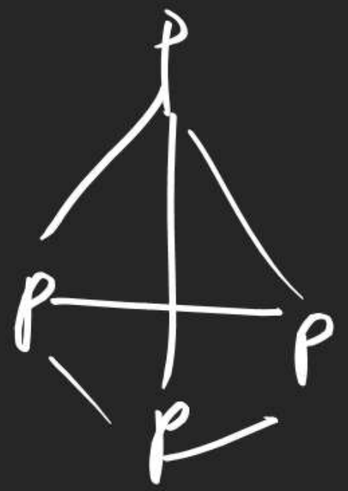
Sn

Pb

P-BLOCK

9. The number of pentagons in C_{60} and trigons (triangles) in white phosphorous, respectively, are

(A) 20 and 3 (B) 12 and 4 (C) 12 and 3 (D) 20 and 4



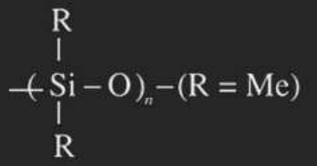
P-BLOCK

10. The noble gas that does NOT occur in the atmosphere is :

(A) He (B) Kr (C) Ne (D) Ra

P-BLOCK

11. The basic structural unit of feldspar, zeolites, mica, and asbestos is :

(A) $(SiO_3)^{2-}$ (B) SiO_2 (C) $(SiO_4)^{4-}$ (D) 

SiO_4^{-4} — Basic structural unit

SiO_2 = Unit

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P-BLOCK

12. The $C - C$ bond length is maximum in :

(A) graphite (B) C_{70} (C) C_{60} (D) diamond

Resonace due double bond Character

sp^3 Single bond Character

P-BLOCK

13. The one that is extensively used as a piezoelectric material is:

(A) tridymite

(B) amorphous silica

(C) quartz

(D) mica

14. Correct statements among a to d regarding silicones are:

(a) They are polymers with hydrophobic character.

(b) They are biocompatible.

(c) In general, they have high thermal stability and low dielectric strength.

(d) Usually, they are resistant to oxidation and used as greases.

(A) (a), (b), (c) and (d)

(B) (a), (b) and (c) only

(C) (a) and (b) only

(D) (a), (b) and (d) only

P-BLOCK

15. Good reducing nature of H_3PO_2 is attributed to the presence of:

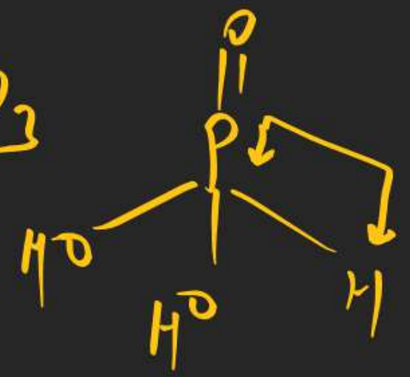
(A) Two $P-OH$ bonds

(B) One $P-H$ bond

(C) Two $P-H$ bonds

(D) One $P-OH$ bond

H_3PO_3



Phosphorous acid

Phosphonic acid

Reducing agent

H_3PO_2

Hypo phosphorous acid

Phosphinic acid

P-BLOCK

16. **Wilkinson catalyst is:**

(A) $[(Ph_3P)_3IrCl]$

(B) $[(Et_3P)_3RhCl]$

(C) $[(Ph_3P)_3RhCl]$

(D) $[(Et_3P)_3IrCl]$

$[RhCl(PPh_3)_3]$

Wilkinson

P-BLOCK

17. The type of hybridisation and number of lone pair(s) of electrons of Xe in $XeOF_4$, respectively, are:

(A) sp^3d^2 and 1

(B) sp^3d and 2

(C) sp^3d^2 and 2

(D) sp^3d and 1

P-BLOCK

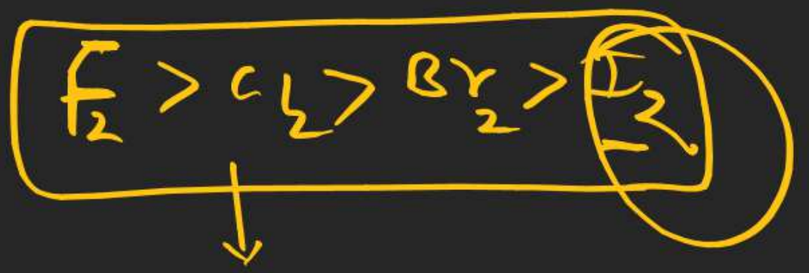
18. Among the following reactions of hydrogen with halogens, the one that requires a catalyst is:

(A) $H_2 + I_2 \rightarrow 2HI$

(B) $H_2 + Cl_2 \rightarrow 2HCl$

(C) $H_2 + Br_2 \rightarrow 2HBr$

(D) $H_2 + F_2 \rightarrow 2HF$



P-BLOCK

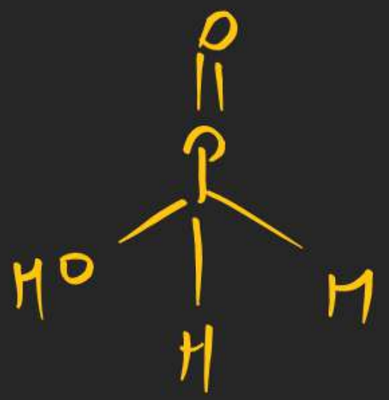
19. The pair that contains two $P-H$ bonds in each of the oxoacids is:

(A) $H_4P_2O_5$ and $H_4P_2O_6$

(B) H_3PO_2 and $H_4P_2O_5$

(C) H_3PO_3 and H_3PO_2

(D) $H_4P_2O_5$ and H_3PO_3



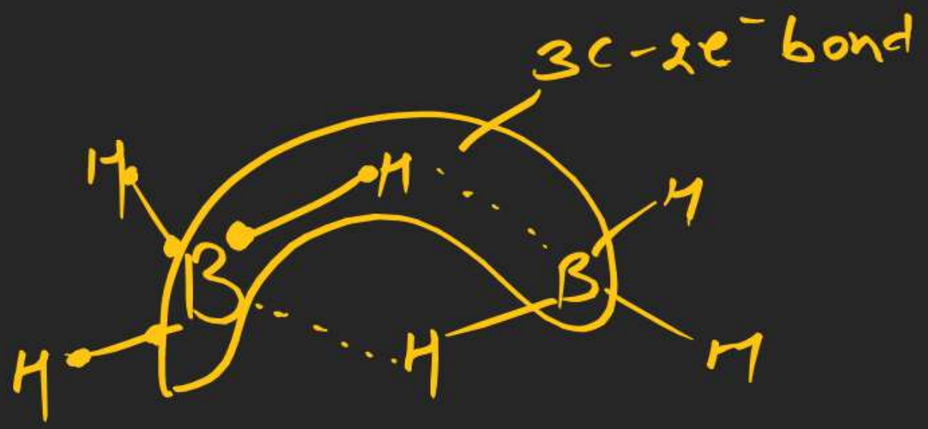
$H_4P_2O_5$

pyrophosphorous acid

P-BLOCK

20. The number of 2-centre-2-electron and 3-centre-2-electron bonds in B_2H_6, respectively, are:

(A) 2 and 1 (B) 4 and 2 (C) 2 and 2 (D) 2 and 4



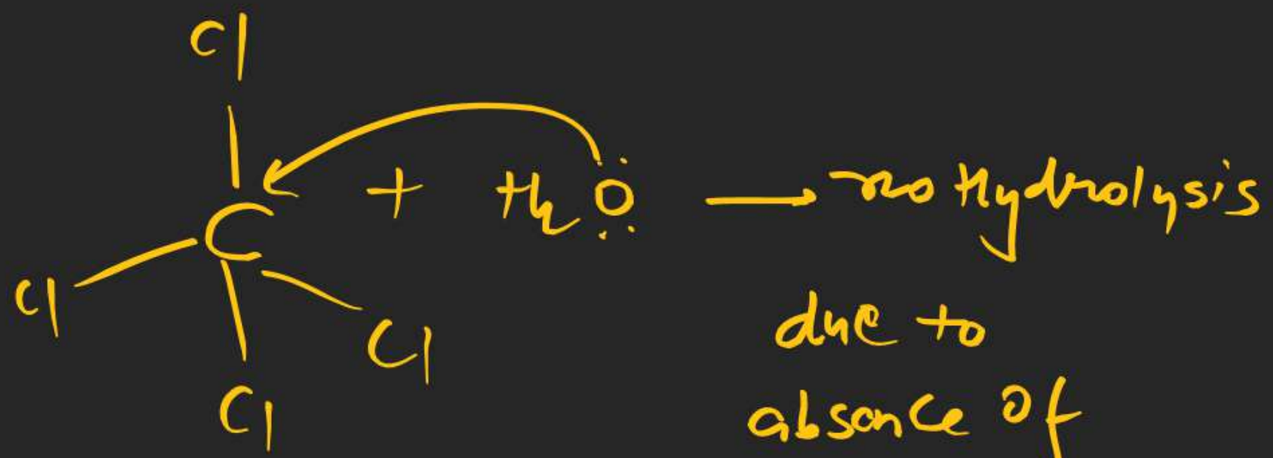
3c-2e⁻ bond = two

2c-2e⁻ = four

P-BLOCK

21. The chloride that CANNOT get hydrolysed is :

(A) $PbCl_4$ (B) CCl_4 (C) $SnCl_4$ (D) $SiCl_4$



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P-BLOCK

22. The hydride that is NOT electron deficient is:

(A) SiH_4 (B) B_2H_6 (C) GaH_3 (D) AlH_3

Oct.
Complete

P-BLOCK

23. Iodine reacts with concentrated HNO_3 to yield Y along with other products. The oxidation state of iodine in Y, is :

(A) 5 (B) 7 (C) 3 (D) 1

Any Reducing agent + Conc. HNO_3 → ic form of oxyacid + NO_2

$I_2 + Conc.\ HNO_3 \rightarrow HIO_3 + NO_2$

$P_4 + Conc.\ HNO_3 \rightarrow H_3PO_4 + NO_2$

$S + Conc.\ HNO_3 \rightarrow H_2SO_4 + NO_2$

$As + Conc.\ HNO_3 \rightarrow H_3AsO_4 + NO_2$

$Sb + Conc.\ HNO_3 \rightarrow H_3SbO_4 + NO_2$

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P-BLOCK

24. The element that does NOT show catenation is :

(A) Ge (B) Si (C) Sn (D) Pb

Except Pb all element show allotropy

P-BLOCK

25. Chlorine on reaction with hot and concentrated sodium hydroxide gives:

(A) Cl^- and ClO_3^-

(B) Cl^- and ClO^-

(C) ClO_3^- and ClO_2^-

(D) Cl^- and ClO_2^-

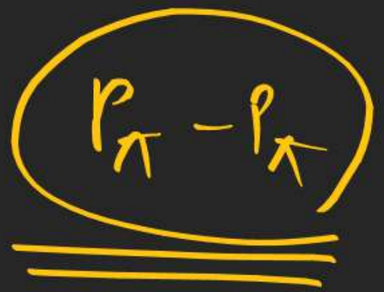
$Cl_2 + NaOH \xrightarrow[(Cold/dil)]{} NaCl + NaOCl$

$Cl_2 + NaOH \xrightarrow[(hot/Conc.)]{} NaCl + NaClO_3$

P-BLOCK

26. The element that shows greater ability to form $p\pi - p\pi$ multiple bonds, is :

(A) Sn (B) C (C) Ge (D) Si



27. Diborane (B_2H_6) reacts independently with O_2 and H_2O to produce, respectively;

(A) B_2O_3 and H_3BO_3

(B) B_2O_3 and $[BH_4]^-$

(C) H_3BO_3 and B_2O_3

(D) HBO_2 and H_3BO_3

Nishant Jindal

P-BLOCK

2020

1. Oxidation state of potassium in $K_2O, K_2O_2 \& KO_2$ are respectively -

(A) $+1, +1, +1$

(B) $+1, +2, +4$

(C) $+1, +2, +2$

(D) $+1, +4, +2$

P-BLOCK

2. Number of $S-O$ bond in $S_2O_8{}^{2-}$ and number of $S-S$ bond in Rhombic sulphur are respectively:

(A) 8,8 (B) 6,8 (C) 2,4 (D) 4,2

$S_2O_8^{-2} \xrightarrow{2H^+} H_2S_2O_8$ (Peroxodisulphuric acid)

S_8

P-BLOCK

3. Which of the following can not act as both oxidising and reducing agent?

(A) H_2SO_3 (B) HNO_2 (C) H_3PO_4 (D) H_2O_2

+4 +3 +5

(A) O.A as well R.A

(B) R.A as well as O.A

$M \longrightarrow M^+ + e^-$ (R.A)

$M^+ + e^- \longrightarrow M$ (O.A)

(C)

(D) H_2O_2

$P = 3s^2 3p^3$

n = val. e^-

O.S Rang = $(n-8)$ to n

P = -3 to +5

S = -2 to +6

Cl = -1 to +7

P-BLOCK

4. First Ionisation energy of Be is higher than that of Boron.

Select the correct statements regarding this

(i) It is easier to extract electron from 2p orbital than 2s orbital

(ii) Penetration power of 2s orbital is greater than 2p orbital

(iii) Shielding of 2p electron by 2s electron

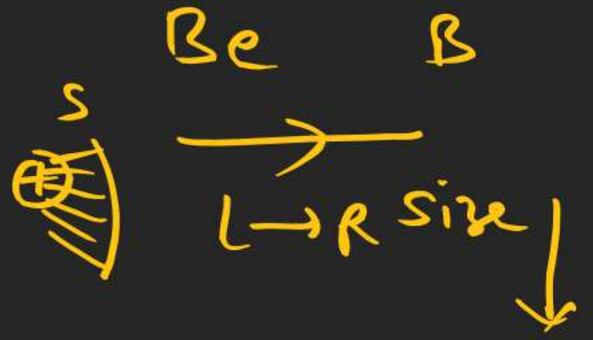
(iv) Radius of Boron atom is larger than that of Be

(A) (i), (ii), (iii), (iv)

(B) (i), (iii), (iv)

(C) (ii), (iii), (iv)

(D) (i), (ii), (iii)



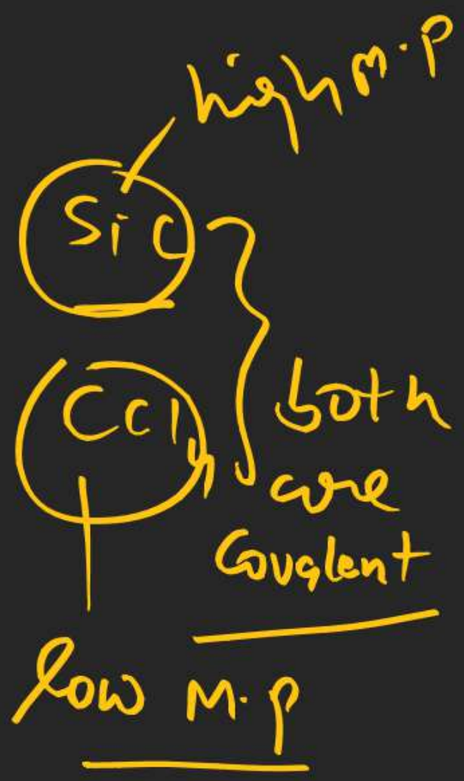
$Be = 1s^2 \boxed{2s^2}$

$B = 1s^2 2s^2 \boxed{2p^1}$

P-BLOCK

5. A substance ' X ' having low melting point, does not conduct electricity in both solid and liquid state. ' X ' can be :

(A) Hg (B) ZnS (C) SiC (D) CCl_4



P-BLOCK

6. A compound $(A; B_3N_3H_3Cl_3)$ reacts with $LiBH_4$ to form inorganic benzene (B).
(A) reacts with (C) to form $B_3\ N_3H_3(CH_3)_3$. (B) and (C) are respectively.

(A) Boron nitride, $MeMgBr$
(B) Boron nitride, $MeBr$
(C) Borazine, $MeBr$
(D) Borazine, MeMgBr

$$B_3N_3H_3Cl_3 + LiBH_4 \longrightarrow B_3N_3H_6$$

$$B_3N_3H_3Cl_3 + (C) \longrightarrow B_3N_3H_3(CH_3)_3$$

Inorganic benzene ⇒ Borazine and Borazol

P-BLOCK

7. On heating compound (A) gives a gas (B) which is a constituent of air. This gas when treated with H_2 in the presence of a catalyst gives another gas (C) which is basic in nature. (A) should not be:

(A) $Pb(NO_3)_2$ (B) $(NH_4)_2Cr_2O_7$

(C) NH_4NO_2 (D) NaN_3

$Pb(NO_3)_2 \xrightarrow{\Delta} PbO + NO_2 + O_2$

$(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} N_2 + Cr_2O_3 + H_2O$

$NH_4NO_2 \xrightarrow{\Delta} N_2 + H_2O$

$NaN_3 \xrightarrow{\Delta} Na + N_2$

Haber process

$N_2 + H_2 \xrightarrow{Fe/Mo} NH_3$

Basic gas

P-BLOCK

8. Aqua regia is used for dissolving noble metals (Au, Pt, etc.). The gas evolved in this process is

(A) NO (B) N_2 (C) N_2O_5 (D) N_2O_3

$3HCl + HNO_3 \longrightarrow NOCl + (Cl) + H_2O$

$Au + HCl + HNO_3 \longrightarrow AuCl_4^- + NO$

P-BLOCK

9. If the boiling point of H_2O is $373\ K$, the boiling point of H_2S will be

(A) less than $300\ K$

(B) more than $373\ K$

(C) equal to $373\ K$

(D) greater than $300\ K$ but less than $373\ K$

$H_2O > H_2Te > H_2Se > H_2S$

373 $\quad$ $\quad$ 213

10. In a molecule of pyrophosphoric acid, the number of $P-OH, P=O$ and $P-O-P$ bonds / moiety(ies) respectively are

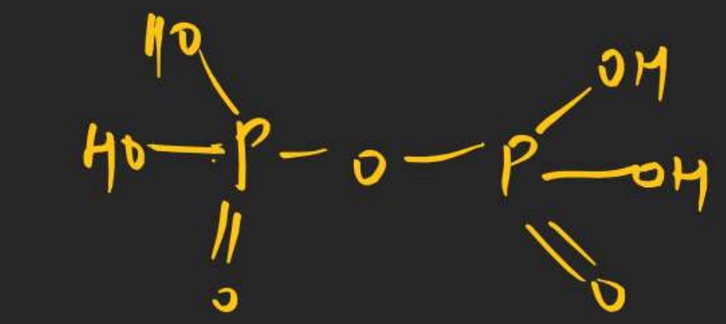
(A) 4,2 and 0 (B) 4,2 and 1 (C) 3,3 and 3 (D) 2,4 and 1

$H_4P_2O_7$

P−OH = four

P=O = two

P−O−P = 1



P-BLOCK

11. On heating, lead (II) nitrate gives a brown gas (A). The gas (A) on cooling changes to a colourless solid/liquid (B). (B) on heating with NO changes to a blue solid (C). The oxidation number of nitrogen in solid (C) is :

(A) +3 (B) +4 (C) +5 (D) +2

$Pb(NO_3)_2 \xrightarrow{\Delta} PbO + NO_2 + O_2$ (Brown gas)

$2NO_2 \xrightleftharpoons{\text{Cooling}} N_2O_4$

N_2O_4 : Colourless gas

$NO + NO_2 \rightarrow N_2O_3$ (Blue solid)

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P-BLOCK

12. The reaction in which the hybridisation of the underlined atom is affected is

(A) $\underline{XeF_4} + SbF_5 \rightarrow [XeF_3^+][SbF_6]^-$ (sp^3d^2 → sp^3d)

(B) $H_2SO_4 + NaCl \xrightarrow{420\ K} Na_2SO_4 + HCl$

(C) $H_3PO_2 \xrightarrow{\text{Disproportionation}} H_3PO_4 + PH_3$

(D) $\underline{NH_3} \xrightarrow{H^+} NH_4^+$ (sp^3 → sp^3)

P-BLOCK

13. The structure of PCl_5 in the solid state is

(A) tetrahedral $[PCl_4]^+$ and octahedral $[PCl_6]^-$

(B) square pyramidal

(C) trigonal bipyramidal

(D) square planar $[PCl_4]^+$ and octahedral $[PCl_6]^-$

$$PCl_5 \longrightarrow PCl_4^{+} + PCl_6^{\ominus}$$

P-BLOCK

14. Reaction of ammonia with excess Cl_2 gives

(A) NH_4Cl and HCl

(B) NCl_3 and HCl

(C) NCl_3 and NH_4Cl

(D) NH_4Cl and N_2

$$NH_3 + Cl_2 \text{ (excess)} \longrightarrow NCl_3 + HCl$$

$$NH_3 + Cl_2 \text{ (excess)} \longrightarrow NH_4Cl + N_2$$

P-BLOCK

15. The correct statement with respect to dinitrogen is

(A) N_2 is paramagnetic in nature

(B) it can be used as an inert diluent for reactive chemicals

(C) it can combine with dioxygen at $25^\circ C$

(D) liquid dinitrogen is not used in cryosurgery

P-BLOCK

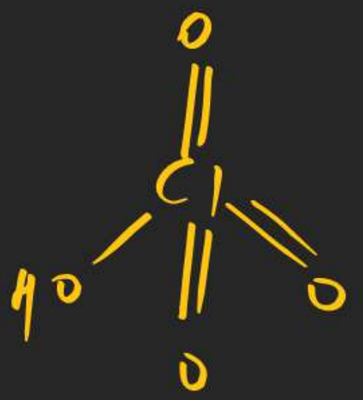
16. The number of Cl=O bonds in perchloric acid is,

$HClO$ = Hypo chlorous acid

$HClO_2$ = Chlorous acid

$HClO_3$ = Chloric acid

$HClO_4$ = Perchloric acid



P-BLOCK

17. The reaction of NO with N_2O_4 at $250\ K$ gives

(A) N_2O_3 (B) N_2O_5 (C) N_2O (D) NO_2

$NO + N_2O_4 \longrightarrow N_2O_3$

or

NO_2

P-BLOCK

18. Reaction of an inorganic sulphite X with dilute H_2SO_4 generates compound Y. Reaction of Y with NaOH gives X. Further, the reaction of X with Y and water affords compound Z. Y and Z, respectively, are

(A) S and Na_2SO_3

(B) SO_2 and $NaHSO_3$

(C) SO_2 and Na_2SO_3

(D) SO_3 and $NaHSO_3$

(X) (Y)

$SO_3^{-2} + H_2SO_4 \longrightarrow SO_2$

$SO_2 + NaOH \longrightarrow Na_2SO_3$

Y (X)

Z

$Na_2SO_3 + SO_2 \longrightarrow NaHSO_3$

(excess)

P-BLOCK

19. Chlorine reacts with hot and concentrated NaOH and produces compounds (X) and (Y).

Compound (X) gives white precipitate with silver nitrate solution. The average bond order between Cl and O atoms in (Y) is

$$Cl_2 + NaOH \longrightarrow \underset{(X)}{NaCl} + \underset{(Y)}{NaClO_3}$$

$$AgNO_3 + \underset{(X)}{NaCl} \longrightarrow \underset{\text{(White ppt.}}{AgCl}$$

$$\frac{5}{3} = 1.67$$