JEE MAIN ANSWER KEY & SOLUTIONS

SUBJECT :- CHEMISTRY
CLASS :- 12th
CHAPTER :- P-BLOCK
PAPER CODE :- CWT-4

ANSWER KEY

1.	(A)	**2.**	(B)	**3.**	(C)	**4.**	(B)	**5.**	(D)	**6.**	(C)	**7.**	(C)
8.	(A)	**9.**	(C)	**10.**	(B)	**11.**	(D)	**12.**	(D)	**13.**	(D)	**14.**	(D)
15.	(D)	**16.**	(D)	**17.**	(A)	**18.**	(D)	**19.**	(D)	**20.**	(B)	**21.**	4
22.	2	**23.**	3	**24.**	6	**25.**	10	**26.**	5	**27.**	3	**28.**	8
29.	6	**30.**	4										

SOLUTIONS

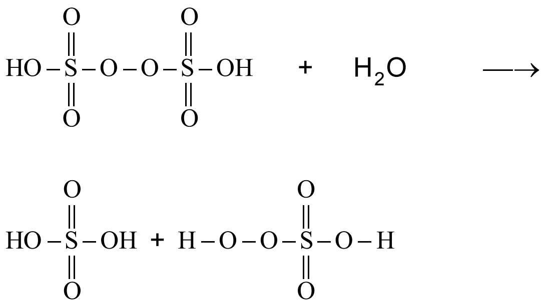
1. (A)
Sol. Red P does not produce phosphine on heating with NaOH]

2. (B)
Sol. $XeF_4 + SbF_5 \longrightarrow [XeF_3]^+ [SbF_6]^-$
$[XeF_3]^+$: sp^3d Bent-T-shape
$[SbF_6]^-$: sp^3d^2 octahedral]

3. (C)
Sol. $I_2 + 10HNO_3 \longrightarrow 2HIO_3 + 10NO_2 + 4H_2O$]

4. (B)
Sol. $KHSO_4$ suppresses the dissociation of H_2SO_4 due to common ion effect.]

5. (D)
Sol. In SF_6, S is sterically hindered by six fluorine atoms hence attack of H_2O molecule will not occur. NF_3 is not hydrolysed due to absence of vacant orbital either on N or F atom.
TeF_6 is hydrolysed due to large size of Te]

6. (C)
Sol.


(Sulphuric Acid) (Peroxomono-sulphuric Acid)]

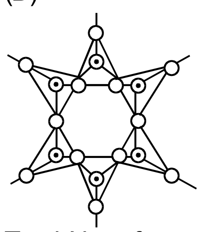
7. (C)
Sol. Due to large size of iodine atom it can accommodate upto seven small fluorine atoms around it while due to smaller sizes of chlorine & bromine atoms they do not accommodate seven fluorine atoms ie steric factor dominate in case of chlorine & bromine.]

8. (A)
Sol. (a) (F); As the sizeof halogen atom increases crowding on Si atom will increase, hence tendency of attack of Lewis base decreases.
(b) (T); M.P. of NH_3 is highest due to intermolecular H–bonding in it.
Next lower M.P. will be of SbH_3 followed by AsH_3 due to high mol. wt. of SbH_3
(c) (F); M.P. & B.P. of increase from PH_3 to SbH_3 via AsH_3 due to increase in mol. wt. NH_3 does not follow this trend due to inter molecular H–bonding.
Increasing B.P. order: $PH_3 < AsH_3 < NH_3 < SbH_3$
(d) (T); Value of bond moment decreases]

9. (C)
Sol. I does not have its valency 4. It has valency 1, 3, 5 & 7]

10. (B)
Sol. $PCl_5 + H_2O \longrightarrow POCl_3 + 2HCl$
(A) (B)
$POCl_3 + 3H_2O \longrightarrow H_3PO_4 + 3HCl$
(B) (C)

11. (D)
Sol. NH_3 is a weak reducing agent than PH_3, because X–H bond strength decreases down the group. Due to absence of H–bonding, only weak vander waals force of attraction exists in PH_3, it has lower critical temperature than NH_3.]

12. (D)
Sol.


Total No. of oxygen atoms per silicon atom = $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+1 = 2.5$
$\therefore$ Formula $Si_2O_5^{2-}$]

13. (D)

Sol. Due to small size of He, it escapes from interstitial spaces / voids of molecular lattice of quinols]

14. (D)

Sol. $\ddot{P}H_3 + H^+ \longrightarrow PH_4^+$

According to Drago's rule lone pair on phosphorus resides in almost pure s-orbital, hence due to nondirectional nature, its overlapping tendency is greatly reduced in comparision to a lone pair present in hybrid orbital, which is directional as present in $\ddot{N}H_3$

15. (D)

16. (D)

Sol. As PtF_6 is a powerful oxidizing agent hence.

$Na + PtF_6 \rightarrow Na^+[PtF_6]^-$

$NO + PtF_6 \rightarrow NO^+[PtF_6]^-$

$Xe + PtF_6 \rightarrow Xe^+ [PtF_6]^-$]

17. (A)

18. (D)

Sol. Vander Waal's force α size

Boiling point α Vander waal's forces]

19. (D)

Sol. Due to Back bonding]

20. (B)

Sol. AlF_3 is ionic. $AlBr_3$ and AlI_3 exist as dimer.]

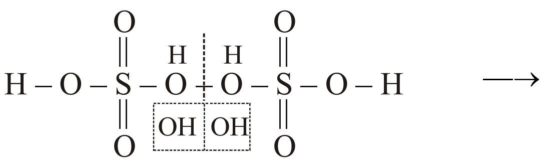
21. 4

Sol. $$\underset{\text{Hot \& conc.}}{3Cl_2 + 6\,OH^-} \xrightarrow{\Delta} \underset{(A)}{\overset{-I}{5Cl^-}} + \underset{(B)}{\overset{+V}{ClO_3^-}} + 3H_2O$$

Algebraic sum of oxidation state of Cl in A and B = – 1 + 5 = + 4]

22. 2

Sol. $H_2S_2O_8$



$2H_2SO_4 + H_2O_2$]

23. 3

Sol. $PCl_5 + 3H_2O \xrightarrow[\text{temperature}]{\text{Room}} H_3PO_4 + 3HCl$ (basicity - 3)

$SF_6 + H_2O \xrightarrow[\text{temperature}]{\text{Room}} \times$

$SF_4 + 3H_2O \xrightarrow[\text{temperature}]{\text{Room}} H_2SO_3 + 4HF$ (basicity -2)

$P_4O_6 + 6H_2O \xrightarrow[\text{temperature}]{\text{Room}} 4H_3PO_3$ (basicity -2)

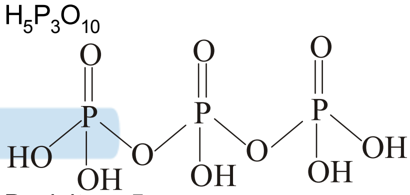
$PCl_3 + 3H_2O \xrightarrow[\text{temperature}]{\text{Room}} H_3PO_3 + 3HCl$ (basicity -2)]

24. 6

Sol. Except CCl_4, NF_3 and SF_6, remaining Six would undergo hydrolysis.

25. 10

Sol. $H_5P_3O_{10}$



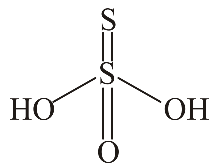
Basicity = 5

Number of P–O–P linkages = 2

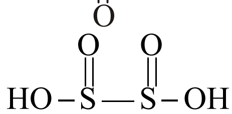
Number of $p\pi$–$d\pi$ bonds = 3]

26. 5

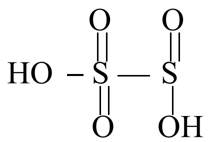
Sol. $H_2S_2O_3$



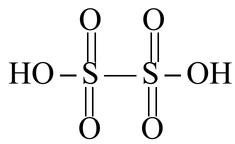
$H_2S_2O_4$



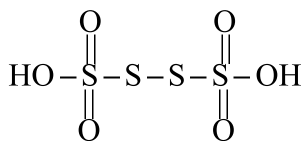
$H_2S_2O_5$



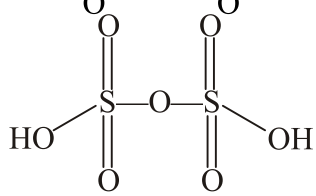
$H_2S_2O_6$



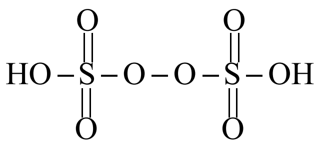
$H_2S_4O_6$



$H_2S_2O_7$



$H_2S_2O_8$



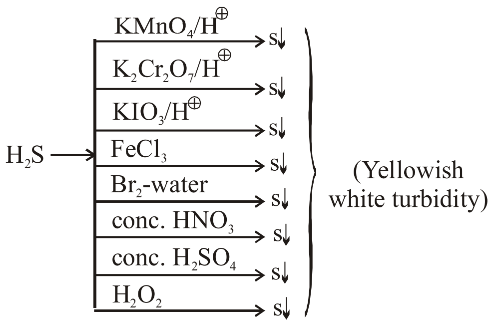
27. 3

Sol. ICN (liquid) = $[I_2(CN)]^+ [ICN_2]^-$

Total no. of CN = 3

28. 8

Sol.



29. 6

Sol. $CN^{\ominus}$, $SCN^{\ominus}$, $OCN^{\ominus}$, $NC^{\ominus}$, $N_3^{\ominus}$ and $TeCN^{\ominus}$ all are pseudohalides

30. 4

Sol. Cu, Hg, Ag, Pb will produced NO gas.