1. In which of the dimerisation process, the achievement of the octet is not the driving force.

(1) $2AlCl_3 \longrightarrow Al_2Cl_6$

(2) $BeCl_2 \longrightarrow BeCl_2$ (solid)

(3) $2ICl_3 \longrightarrow I_2Cl_6$

(4) $2NO_2 \longrightarrow N_2O_4$

2.

Column I	**Column II**
(A) B_2H_6	(P) (3C–4e⁻) bond
(B) Be_2H_4	(Q) (3C–2e⁻) bond
(C) Be_2Cl_4	(R) Vacant orbital participation in hybridisation
(D) $Al_2(CH_3)_6$	(S) sp^3 hybridisation
	(T) sp^2 hybridisation

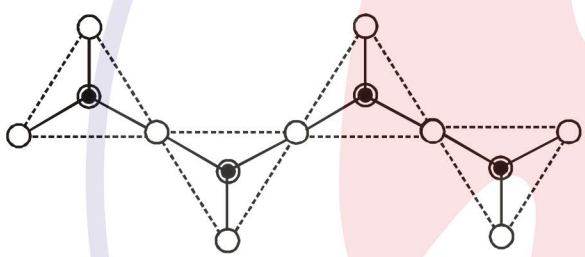
(1) (A) – Q,R,S; (B) – Q,R,T; (C) – P,R,T; (D) – Q,R,S

(2) (A) – Q,R,S,T; (B) – R,T; (C) – P,R,T; (D) – R,S

(3) (A) – S,T; (B) – R,T; (C) – P,R,T; (D) – R,S,T

(4) (A) – Q,S,T; (B) – R,T; (C) – P,R; (D) – R,S,T

3. A mineral contain following tetrameric anion in which ● = Si, ○ = oxygen



Select **correct** option (s) about anion in mineral–

(1) Formula of anion is $(SiO_3)_n^{2n-}$ (where n = 4).

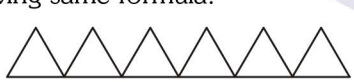
(2) The total 10 negative charges are present in this anion.

(3) It has three shared oxygen/corners and ten unshared oxygen/corners.

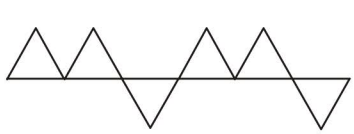
(4) It is non planar

4. Silicate are existing mainly in the polymeric form. Several categories are available with us which depend on the mode of sharing of corners of SiO_4^{4-} tetrahedron.

Which of the following pyroxene chain silicate is having same formula.

(1) 

(2) 

(3) 

(4) All of these

5. The geometry with respect to the central atom of the following molecules are:

$N(SiH_3)_3$; Me_3N ; $(SiH_3)_3P$

(1) planar, pyramidal, planar

(2) planar, pyramidal, pyramidal

(3) pyramidal, pyramidal, pyramidal

(4) pyramidal, planar, pyramidal

6.

Column–I	**Column–II**
(A) $\underline{N}(SiH_3)_3$	(P) pπ–dπ back bonding
(B) $\underline{N}(CH_3)_3$	(Q) sp^3 hybridisation for underlined atom
(C) $\underline{B}_2H_6$	(R) pπ–pπ back bonding
(D) $\underline{B}F_3$	(S) neither pπ–pπ nor pπ–dπ back bonding
	(T) Underlined atom combine with electron rich molecule

(1) (A) – P; (B) – Q,S; (C) – Q,S,T; (D) – R,T

(2) (A) – P,Q; (B) – Q,S,T; (C) – R,T; (D) – S,T

(3) (A) – P,Q; (B) – R,T; (C) – S,T; (D) – R,S,T

(4) (A) – R,S,T; (B) – Q,R,S,T; (C) – S,T; (D) – P,Q,S,T

7. Choose the correct on the Cl–O bond length in $NaClO_4$.

(1) All Cl–O bonds are of equal length.

(2) Three Cl–O bonds are of equal of length one longer.

(3) Two Cl–O bonds are of same length which are longer compound to other two Cl–O bond length.

(4) All Cl–O bond lengths are different

8.

Column I (Pair of species)	**Column II (Identical Property in pairs of species)**
(A) PCl_3F_2, PCl_2F_3	(P) Hybridisation of central atom
(B) BF_3 & BCl_3	(Q) Shape of molecule / ion
(C) CO_2 & CN_2^{-2}	(R) μ (dipole moment)
(D) C_6H_6 & $B_3N_3H_6$	(S) Total number of electrons

(1) (A) – P,Q; (B) – P,Q,R; (C) – P,Q,RS; (D) – P,Q,R,S

(2) (A) – P,Q,R,S; (B) – P,Q; (C) – R,S; (D) – P,Q

(3) (A) – P,Q; (B) – S,R; (C) – Q,R,S; (D) – R,S

(4) (A) – P,Q; (B) – S,R; (C) – P,R; (D) – P,Q,R

9. Match the Column :

Column–I	**Column–II**
(A) $(CH_3)_2PF_3$	(P) Lone pair of electrons on central atom = 1
(B) SF_4	(Q) Central atom is sp^3d hybridised
(C) XeF_4	(R) Equal length of all central atom–fluorine bond
(D) BrF_3	(S) Total number of lone pair of electrons is more than 9

(1) (A) – Q; (B) – P,Q,S; (C) – R,S; (D) – Q,S
(2) (A) – P,Q; (B) – P,Q,S; (C) – S,R; (D) – P,S
(3) (A) – R,S; (B) – P,Q,S; (C) – S,R; (D) – P,S
(4) (A) – Q,S; (B) – P,Q,S; (C) – S,R; (D) – P,Q,R,S

10. Select correct statement about hydrolysis of BCl_3 and NCl_3
(1) NCl_3 is hydrolysed and gives HOCl but BCl_3 is not hydrolysed.
(2) Both NCl_3 and BCl_3 on hydrolysis gives HCl
(3) NCl_3 on hydrolysis gives HOCl but BCl_3 gives HCl
(4) Both NCl_3 and BCl_3 on hydrolysis gives HOCl

11. Which of the following statements are correct for SOF_4 molecule.
(1) It is square pyramidal in shape
(2) On hydrolysis it produces H_2SO_4 and HF
(3) All S–F bond lengths are of identical length
(4) Two S–F bond lengths are longer compared to other two S–F bond lengths

12. **Statement-1 :** H_3BO_3 in water behaves as monobasic acid.
Statement-2 : The ionisation reaction is:

$$H_3BO_3 + H_2O \rightleftharpoons B(OH)_4^- + H^+$$

(1) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
(2) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1
(3) Statement-1 is true, statement-2 is false.
(4) Statement-1 is false, statement-2 is true.

13. For H_3PO_3 and H_3PO_4, the correct choice is
(1) H_3PO_3 is dibasic and reducing agent.
(2) H_3PO_3 is dibasic and non reducing agent.
(3) H_3PO_4 is tribasic and reducing agent
(4) H_3PO_4 is tribasic and non reducing agent.

14. Which of the following statement is **incorrect**?
(1) Oxidizing power order : $SiCl_4 < SnCl_4 < PbCl_4$
(2) Ionic character order : CsBr > RbBr > KBr > NaBr > LiBr
(3) The ionic character of lead (II) halides decreases with increase in atomic no. of halogen
(4) The oxidation state of T*l* in TlI_3 is +3.

15. Choose the correct statement regarding bond angle:-
(1) $\widehat{FCF}$ in F_2CO < $\widehat{HCH}$ in H_2CO
(2) $\widehat{BrPBr}$ in PBr_3 < $\widehat{FPF}$ in PF_3
(3) $\widehat{FSF}(eq) > \widehat{FSF}(ax)$ in SF_4
(4) All $\widehat{FIF}$ angles in IF_5 are identical

16.

Column I	**Column II**
(A) Dithionous acid	(P) S–O–S bond is not present
(B) Thiosulphuric acid	(Q) All S atom in the molecule has oxidation state +3
(C) Caro's acid	(R) Acidic strength of –OH groups present in the molecule is different
(D) Pyrosulphurous acid	(S) at least one S atom has oxidation state +5 in molecule

(1) (A) – P,Q; (B) – P; (C) – P,Q; (D) – P,R,S
(2) (A) – P; (B) – P,Q; (C) – P,R,S; (D) – P,Q,R,S
(3) (A) – P,Q; (B) – R,S; (C) – P,Q,S; (D) – P,Q,R,S
(4) (A) – P,Q,R,S; (B) – R,S; (C) – P,Q,R,S; (D) – P,Q

17. Structure of $Na_2[B_4O_5(OH)_4] \cdot 8H_2O$ contains
(1) Two triangular and two tetrahedral units
(2) Three triangular and one tetrahedral units.
(3) All tetrahedral units.
(4) All triangular units.

18. Which of the following statement is incorrect :-
(1) The free electron of ClO_3 molecule is present in d-orbital of Cl-atom
(2) The free electron of $\dot{C}F_3$ is present in sp^3 hybrid orbital
(3) NO is polar
(4) The free electron of ClO_2 molecule is present in d-orbital of Cl-atom

19. Which of the following statement is incorrect regarding the structure of XeO_2F_4 molecule :-

(1) Xe = O bonds are present in axial position

(2) All Xe–F bond lengths are identical

(3) $\widehat{FXeF}$ angles are 90°

(4) Shape of the molecule is octahedral

20.

	Column I	Column II
(A)	ClO_2	(P) Non planar
(B)	ClO_3	(Q) $\mu \neq 0$
(C)	NO_2	(R) Linear
(D)	NO	(S) planar
		(T) sp^3 hybridisation

(1) (A) – Q,S; (B) – P,Q,T; (C) – Q,S; (D) – Q,R,S

(2) (A) – P,Q,S; (B) – P,Q,T; (C) – P,Q,S; (D) – Q,S

(3) (A) – Q,S; (B) – P,Q,T; (C) – P,Q,R,S,T; (D) – P,T

(4) (A) – P,Q,R,S; (B) – P,Q,S; (C) – Q,S; (D) – P,Q,R,S

21.

	Compound	Properties
A	B_2H_6, H_3^+	3c 2e bond
B	HNO_3, H_2SO_4	pp bond
C	AlF_3, $AlCl_3$	Hypovalent
D	NCl_3, $SbCl_3$	Equal bond angles

Correct code is :

(1) A (2) A,C (3) A,D (4) All

22. In which of the following options all species contain X–O–X bonds in structure (X = central atom)

(1) $H_2S_2O_5$, S_3O_9, $S_2O_6^{-2}$

(2) P_4O_{10}, P_4O_6, $H_3P_3O_9$

(3) N_2O_5, N_2O, N_2O_4

(4) $H_4P_2O_7$, $H_4P_2O_6$, $H_4P_2O_5$

23. Which is not correct ?

(1) Borax : Cyclic, 2-(six member ring)

(2) Calgon : Cyclic, (10 member ring)

(3) Beryl : Cyclic silicate

(4) P_4O_{10} : Cyclic, four -(Six member ring)

24. Which of the following reaction is nonspontaneous:-

(1) $2F_2 + 2H_2O \longrightarrow 4HF(aq) + O_2$

(2) $Cl_2 + H–OH \longrightarrow HCl + HOCl$

(3) $Br_2 + H–OH \longrightarrow HBr + HOBr$

(4) $2I_2 + 2H_2O \longrightarrow 4HI + O_2$

25. Which of the following group of molecules can act both as oxidant as well as reductant :-

(1) $KMnO_4$, O_3, SO_3

(2) $HC\ell O_4$, HNO_3, H_2O_2

(3) HNO_3, SO_2, O_3

(4) HNO_2, SO_2, H_2O_2

26. Which of the following order is not correct :-

(1) $CO_2 < SiO_2 < GeO_2 < SnO_2 < PbO_2$ (Oxidising nature)

(2) $MnO_4^- > TeO_4^- > ReO_4^-$ (Oxidising nature)

(3) $CH_4 < SiH_4 < GeH_4 < SnH_4 < PbH_4$ (Reducing nature)

(4) $HOCl < HClO_2 < HClO_3 < HClO_4$ (Oxidising nature)

27. Which of the following halides cannot be hydrolysed?

(1) TeF_6 (2) SF_6 (3) PCl_5 (4) PCl_3

28. Which of the following is not correctly matched

(1) XeF_2 and XeF_4 $\Rightarrow$ Non polar but planar.

(2) XeF_6 $\Rightarrow$ exists in solid state as XeF_5^+ and F^-

(3) $XeOF_4$ $\Rightarrow$ sp^3d^2, square pyramidal shape, all identical B.L.

(4) XeO_3 $\Rightarrow$ pyramidal, all bond angles are identical.

29. $S^{2-}$and SO_3^{2-} can be distinguished by using:

(1) $(CH_3COO)_2Pb$ (2) $Na_2[Fe(CN)_5NO]$

(3) both (1) and (2) (4) none of these

30. Chromyl chloride test is given by -

(1) CH_3Cl (2) AgCl

(3) Hg_2Cl_2 (4) NH_4Cl

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**3**	**1**	**2,3**	**4**	**2**	**1**	**1**	**1**	**1**	**3**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**2,4**	**1**	**1,4**	**4**	**1**	**1**	**1**	**1**	**1**	**1**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**1**	**2**	**2**	**4**	**4**	**4**	**2**	**3**	**3**	**4**