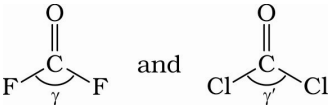
Level - 1	**DTS-2**

16.(B) Tendency to show lower (+2) oxidation state increases due to inert pair effect.

17.(B)  and

Bond angle : $\gamma' > \gamma$

Due to steric repulsion & lone pair repulsions by two chlorine atoms.

18.(D) Atomic size increases in a group from top to bottom. But in group-13, gallium (Ga, 1.35 Å) has size smaller than aluminium (1.43 Å) because of poor shielding effect of d electrons in Ga.

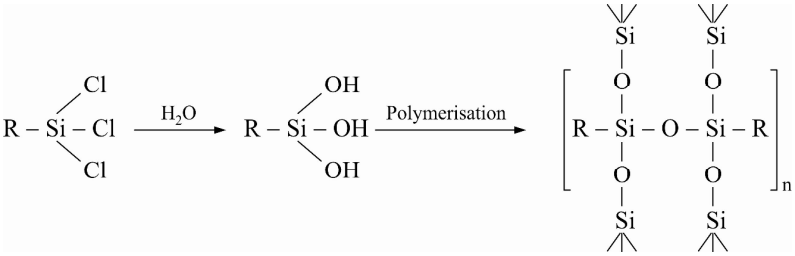
19.(D) When two oxygen atoms of each SiO_4^{4-} tetrahedron are shared with others, cyclic or ring structures are obtained. These silicates are known as cyclosilicates or cyclic silicates. $[Si_6O_{18}]^{12-}$ is an example of cyclosilicate. In this silicate six SiO_4^{4-} tetrahedra are linked together.

20.(B) A recently discovered family of carbon allotropes is fullerenes. The most common fullerene has the formula C_{60} and contains hexagonal and pentagonal rings of carbon atoms and is called Buckminster Fullerene.

21.(C) The basic structural unit in silicates is SiO_4^{4-} tetrahedron. In SiO_4^{4-} unit, silicon atom is bonded to four oxide ions tetrahedrally.

22.(B) $2Pb(NO_3)_2 \xrightarrow{\Delta} 2PbO + 4NO_2 + O_2$

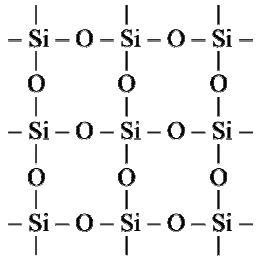
23.(B) $RSiCl_3$ gives cross linked silicone polymer on hydrolysis.



24.(D) Orthosilicic acid (H_4SiO_4), on heating at high temperature, loses two water molecules and gives silica (SiO_2) which on reduction with carbon gives carborundum (SiC) and CO.

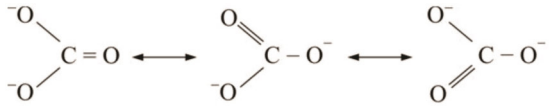
$$H_4SiO_4 \xrightarrow[-2H_2O]{1000^\circ C} SiO_2 \xrightarrow[\Delta]{C} \underset{\text{Carborundum}}{SiC} + CO$$

25.(B) In silica, silicon has large size, so the 3p-orbitals of Si do not overlap effectively with 2p-orbitals of oxygen. Therefore, (Si = O) are not formed. The tetravalency of Si is satisfied by the formation of Si – O bonds, thus it is surrounded by the four oxygen atoms.



26.(C) **II.** Pb^{2+} is more stable than Pb^{4+}, due to inert pair effect.

III. In carbonate ion (CO_3^{2-}) all the three C – O bonds are identical due to resonance.



IV. B_2 is paramagnetic due to presence of 2 unpaired electrons while C_2 is diamagnetic.

(Refer MOT)

27.(C) Due to inert pair effect, the stability of +2 oxidation state increases as we move down the group.

$\therefore$ $SiX_2 < GeX_2 < SnX_2 < PbX_2$

28.(A) In SiF_6^{2-} and $SiCl_6^{2-}$, former is known due to the small size of F atoms. The small six F atoms can be easily accommodated around Si atom to form SiF_6^{2-} while $SiCl_6^{2-}$, six large Cl atoms cannot be accommodated around Si atom.

29.(D) C-atoms form covalently bonded plates (layers). Layers are bonded weakly together, that's why one layer can slide over other causing lubricacy. Cannot be melted easily as large number of atoms are bonded strongly in the layer to form big entity.

30.(B) Water glass is sodium silicate Na_2SiO_3 $[Na_2O + SiO_2]$.