

SL & HL Questions on Covalent structures (1)

1. Draw the Lewis structure for a molecule of:
 - (a) oxygen
 - (b) nitrogen
 - (c) tetrachloromethane
 - (d) carbon dioxide
 - (e) carbon monoxide
2. One Lewis structure for the carbonate ion, CO_3^{2-} , shows one double $\text{C}=\text{O}$ bond and two single $\text{C}-\text{O}$ bonds. Explain why the bond lengths of all the carbon to oxygen bonds in the carbonate ion are equal.
3. Suggest why aluminium chloride, AlCl_3 , readily dimerises to form Al_2Cl_6 .
4. The oxygen to oxygen bonds in oxygen, $\text{O}_2(\text{g})$ and ozone, $\text{O}_3(\text{g})$ are both broken down by ultraviolet light in the atmosphere. Suggest why higher energy ultraviolet light is required to break the oxygen to oxygen bond in oxygen gas compared to the oxygen to oxygen bond in ozone gas.
5. Suggest a reason why diagrams of organic structures containing a phenyl ring often show the phenyl ring as a hexagon with a circle inside rather than as a hexagon with alternate double and single bonds.
6. Explain why graphite and diamond both have very high melting points (in the region of 4000°C) and yet diamond is a poor electrical conductor whereas graphite is a good electrical conductor.
7. Describe the structures of both diamond and silicon and suggest why silicon has a lower melting point than diamond.
8. Explain why silicon dioxide has a high melting point (above 1600°C) whereas carbon dioxide is a gas at room temperature and pressure.