

- Silicon and carbon are both in Group 14 and form dioxides. Carbon dioxide is a gas at room temperature while silicon dioxide (sand) is a solid with a high melting point. Describe the bonding in these two materials and explain the differences in properties they show.

CO₂ contains discrete molecules. Carbon makes four bonds by making two C=O double bonds. The C=O double bonds have strong σ and π components. Although these bonds are quite polar, these molecules are linear and do not possess dipole moments. Only very weak dispersion intermolecular forces hold the molecules together and CO₂ is a gas at room temperature.

SiO₂ is a network covalent solid. Each silicon makes four bonds by making four Si-O single bonds. The covalent network leads to a very strongly bonded solid with a very high melting point.