

Explain why SiO has a higher melting point than PbO in terms of bonding and structure.

Answer: Solid silicon monoxide SiO has a linear polymeric structure $(\text{SiO})_n$: $\sim\text{Si-O-Si-O-Si-O}\sim$

And lead monoxide PbO has a molecular structure, where molecules are separated from each other and interact with one another as polar dipoles (dotted line shows the attraction): $\text{Pb=O} \cdots \text{Pb=O} \cdots \text{Pb=O}$

During the melting, in solid silicon monoxide $(\text{SiO})_n$ strong chemical bonds Si-O are destroyed and separate molecules Si=O are formed, it requires a larger increase of kinetic energy of molecules. While in solid lead monoxide PbO molecules are already separated from each other, and they need smaller increase of kinetic energy to make a phase transition from solid into liquid state.

The melting point of SiO is higher than PbO because melting of SiO requires higher kinetic energy of molecules (which is directly proportional to the temperature) to break the crystal structure and form a liquid.