

Chemguide – questions

GIANT COVALENT STRUCTURES

1. Diamond, graphite and silicon dioxide are all examples of giant covalent structures. What does the word *giant* mean in this context?
2.
 - a) Draw a diagram to show the arrangement of carbon atoms in a diamond crystal.
 - b) Draw a diagram or diagrams to show the arrangement of carbon atoms in a graphite crystal.
3. Answer the following questions by referring to the diagrams you have drawn in question 2.
 - a) Explain why diamond is very hard, whereas graphite is so soft that it can be used in pencils or as a lubricant.
 - b) The densities of diamond and graphite are: diamond 3.51 g cm^{-3} ; graphite 2.25 g cm^{-3} . Explain why graphite is less dense than diamond.
 - c) Although graphite is very much softer than diamond, both substances have very high melting points. Explain why that is.
 - d) Explain why graphite conducts electricity whereas diamond doesn't.
 - e) Explain why neither material is soluble in water or any other solvent under normal conditions.
4.
 - a) Draw a diagram to show the structure of silicon dioxide.
 - b) Explain why silicon dioxide
 - (i) is hard;
 - (ii) has a high melting point;
 - (iii) doesn't conduct electricity;
 - (iv) is insoluble in water and other solvents.