Network Solids and Discrete Molecules

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Show your work for written answers.

In a covalent network solid, bonds connect atoms through an extended structure. A molecular solid contains separate molecules with intermolecular attractions between them.

1 Which description represents a covalent network solid?

(1) Many atoms linked by covalent bonds through the material

(2) Isolated molecules with weak attractions between them

(3) A gas with no bonds or interactions

(4) A solution containing only free ions

2 Explain why melting a molecular solid can leave its molecules intact. [1]

Answer and work

3 What can a formula such as SiO_2 tell you in a model of a covalent network?

(1) The ratio of Si atoms to O atoms

(2) That the network must contain separate three-atom molecules

(3) That there are only two total atoms in the solid

(4) That all bonds in the solid are ionic

4 Why can breaking apart a covalent network require a much higher temperature than melting a simple molecular solid? [1]

Answer and work

Comparing Model Solid Structures

Use the information below to answer the questions.

The table describes model solid structures and their measured melting behavior at the same pressure.

Sample	Structure description	Melting behavior
P	Atoms linked by covalent bonds through the material	Melts only at very high temperature
Q	Separate neutral molecules with attractions between molecules	Melts at low temperature
R	Positive and negative ions in a repeating lattice	Melts at high temperature

5 Which sample is a covalent network solid?

(1) P

(2) Q

(3) R

(4) All three

6 Identify the molecular solid and explain how its structure accounts for its lower melting temperature in this comparison. [1]

Answer and work

7 Which observation is shared by P and R and therefore cannot distinguish a covalent network from an ionic lattice by itself?

(1) High melting temperature

(2) Separate neutral molecules

(3) Positive and negative ions in a lattice

(4) Extended covalent bonds

8 A student says P and R must have the same bond type because both have high melting temperatures. Use the structures to evaluate the claim. [1]

Answer and work