

### Quiz (Application of Bonding, Structure and Properties)

1. The following table gives information about some properties of substances A to D.

Substance	Melting point (°C)	Boiling point (°C)	Electrical conductivity	
			Solid	Molten
<b>A</b>	-7	59	poor	poor
<b>B</b>	842	1484	good	good
<b>C</b>	1670	2230	poor	poor
<b>D</b>	801	1413	poor	good

Answer the following questions and explain your answers.

- Which substance has a giant metallic structure?
  - Which substance has a giant ionic structure?
  - Which substance has a simple molecular structure?
  - Which substance has a giant covalent structure?
  - Which substance is likely to be soluble in non-aqueous solvents like tetrachloromethane?
2. Predict the
- formula
  - structure
  - physical properties:
    - melting point and boiling point,
    - physical state at room temperature and pressure,
    - solubility and
    - electrical conductivity
 of the compound formed between
    - potassium and sulphur
    - nitrogen and fluorine.

3. Predict the

(i) formula

(ii) structure

(iii) physical properties:

(1) melting point and boiling point,

(2) physical state at room temperature and pressure,

(3) solubility and

(4) electrical conductivity

of the compound formed from the reaction between

(a) magnesium and bromine

(b) phosphorus and chlorine.

(Assume that each atom in the compound has attained the electronic arrangement of the nearest noble gas after reaction.)

**Suggested Answer**

1. (a) B. This is because it conducts electricity in the solid state or when molten.
- (b) D. This is because it does not conduct electricity in the solid state but conducts electricity when molten.
- (c) A. This is because it has a low melting point and a low boiling point. Besides, it does not conduct electricity no matter it is in the solid state or when molten.
- (d) C. This is because it has a high melting point and a high boiling point. Besides, it does not conduct electricity no matter it is in the solid state or when molten.
- (e) A. This is because substances with simple molecular structure are usually soluble in non-aqueous solvent.

2. (a) (i) The compound formed between a metal (potassium) and a non-metal (sulphur) is an ionic compound.

Potassium is a Group I element. It forms  $K^+$  ions. Sulphur is a Group VI element. It forms  $S^{2-}$  ions.

∴ the formula of the compound is  $K_2S$ .

- (ii) It has a giant ionic structure.

- (iii) Its physical properties:

- (1) High melting point and boiling point
- (2) Solid at room temperature and pressure
- (3) Soluble in water but insoluble in non-aqueous solvents like tetrachloromethane
- (4) Non-conductor of electricity in the solid state; conductor when molten or in aqueous solution.

- (b) (i) The compound formed between non-metals (nitrogen and fluorine) is a covalent compound.

Nitrogen is a Group V element which requires three electrons to get the stable electronic arrangement.

Fluorine is a Group VII element which requires one electron to get the stable electronic arrangement.

∴ the formula of the compound is  $NF_3$ .

- (ii) It has a simple molecular structure.

- (iii) Its physical properties:
  - (1) Low melting point and boiling point
  - (2) Gas
  - (3) Slightly soluble in water but soluble in non-aqueous solvents like tetrachloromethane.
  - (4) Non-conductor of electricity no matter it is in the solid or liquid state.

3. (a) (i)  $\text{MgBr}_2$

(ii) It has a giant ionic structure.

(iii) Its physical properties are:

- (1) High melting point and boiling point
- (2) Solid at room temperature and pressure
- (3) Soluble in water but insoluble in non-aqueous solvents
- (4) Non-conductor of electricity in the solid state; conductor when molten or in aqueous solution

(b) (i)  $\text{PCl}_3$

(ii) It has a simple molecular structure.

(iii) Its physical properties are:

- (1) Low melting point and boiling point
- (2) Gas at room temperature and pressure
- (3) Insoluble in water but soluble in nonaqueous solvents
- (4) Non-conductor of electricity no matter it is in the solid or liquid state.