

Module 1

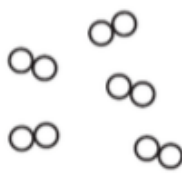
1. Choose the two descriptions which best describe how particles are arranged in a solid. Tick the appropriate two boxes in the solid column of table. Repeat the steps for liquid and gas.

	solid	liquid	gas
close together			
far apart			
in a regular manner			
random			

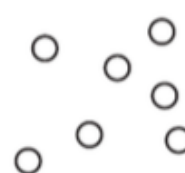
2. The diagram shows models of various structures



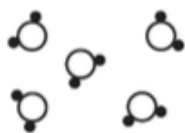
A



B



C



D



E



F

- (a) Which two of the structures A to F represent elements?
- (b) Which one of the structures A to F represents a noble gas?
- (c) (i) Which one of the structures represents an element in group 7?
 (ii) Name an element in period 3 that is most likely to match your answer in c(i).
- (d) Structure D represents a compound.
 (i) State what is meant by the term compound.
 (ii) Name a compound that structure E is most likely to represent?

5078 Science (Chemistry & Biology)
Module 1: Particulate Nature of Matter

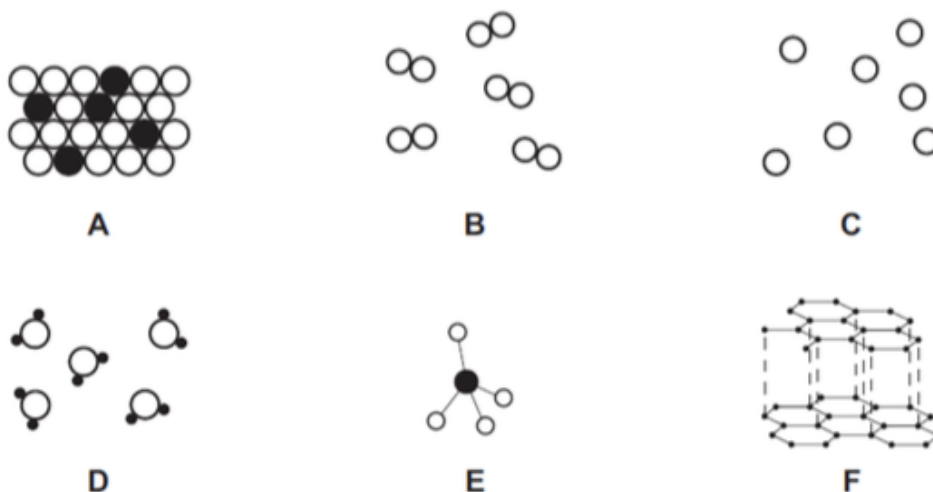
3. Compounds can be distinguished as having either ionic, covalent or metallic bonds.
- (a) Define the term ionic bonding.
 - (b) Name the types of bonding in fluorine and calcium hydroxide.
 - (c) Draw a 'dot and cross' diagram of the compound calcium fluoride, showing only the outer shell electrons.
 - (d) With reference to the structure of an atom, explain why ionic compounds have higher volatility than covalent compounds.

Module 1 (Solutions)

Q1. Choose the two descriptions which best describe how particles are arranged in a solid. Tick the appropriate two boxes in the solid column of table. Repeat the steps for liquid and gas.

	solid	liquid	gas
close together	✓	✓	
far apart			✓
in a regular manner	✓		
random		✓	✓

Q2. The diagram shows models of various structures



- (e) Which two of the structures A to F represent elements? **B and C.**
- (f) Which one of the structures A to F represents a noble gas? **C.**
- (g) (i) Which one of the structures represents an element in group 7? **B.**
- (ii) Name an element in period 3 that is most likely to match your answer in c(i) . **Fluorine/chlorine/bromine/astatine.**
- (h) Structure D represents a compound.
- (iii) State what is meant by the term compound.
Compounds are made up of two or more elements, chemically combined.

5078 Science (Chemistry & Biology)
Module 1: Particulate Nature of Matter

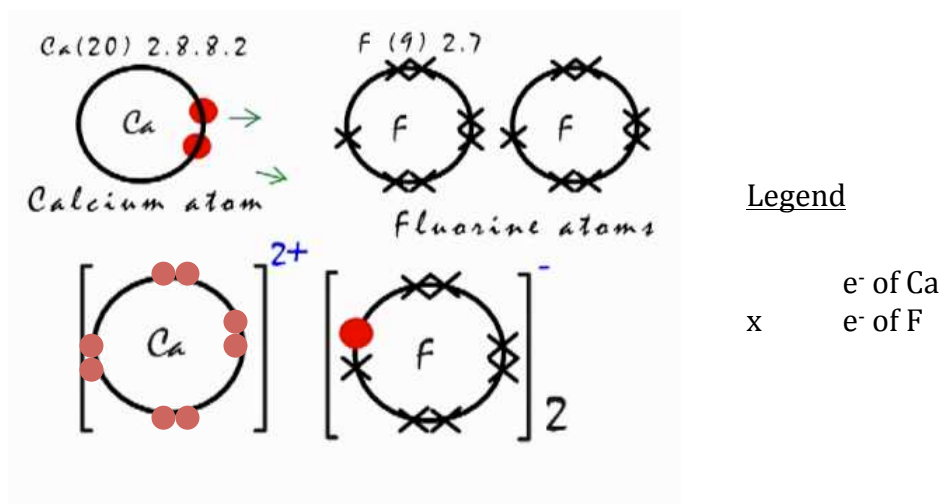
- (iv) Name a compound that structure E is most likely to represent?
Methane, CH₄ or Carbon Tetrachloride, CCl₄.

Q3. Compounds can be distinguished as having either ionic, covalent or metallic bonds.

- (a) Define the term ionic bonding.
Ionic bonding is defined as the chemical bond formed between metal and non-metal, where the former donates electron to the latter.

- (b) Name the types of bonding in fluorine and calcium hydroxide.
Fluorine: Covalent bond
Calcium hydroxide: Ionic bonding and covalent bonding.

- (c) Draw a 'dot and cross' diagram of the compound calcium fluoride, showing only the outer shell electrons.



- (d) With reference to the structure of an atom, explain why ionic compounds have higher volatility than covalent compounds.

Large amount of energy is required to overcome the electrostatic force of attraction in the giant lattice structure of an ionic compound. On the other hand, the Van der Waals forces between the molecules of simple covalent compounds are very weak, little energy is needed to overcome them. Hence, ionic compounds have higher volatility than covalent compounds.