



OXFORD
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Cambridge IGCSE® & O Level Complete Chemistry Workbook

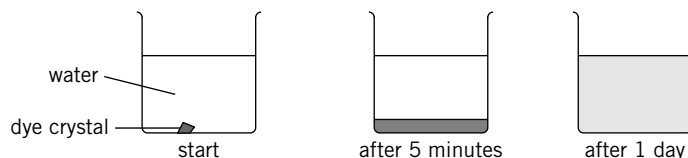
Fourth Edition

Revised
edition

Roger Norris

OXFORD

1. A student placed a crystal of a blue dye at the bottom of a beaker of water. After 5 minutes, the crystal disappeared. After 1 day, the solution was blue throughout.



- a. Suggest how you could use a thin glass tube to place the crystal at the bottom of the beaker of water.

..... [2]

- b. State the name of the process occurring when:

i. the dye changes from a solid to a solution. [1]

ii. the colour spreads throughout the water. [1]

- c. Use ideas about moving particles to explain the results shown in the diagram.

..... [3]

- d. Draw lines to link the names of the particles on the left with the correct definitions on the right.

atom

a particle with a positive or negative charge

ion

two or more atoms joined (bonded) together

molecule

the smallest neutral particle that can take part in a chemical change

[1]

2. a. Which are larger, dust particles or the particles of oxygen and nitrogen in the air?

Explain how you know this.

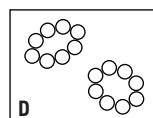
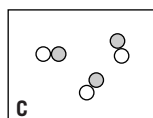
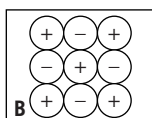
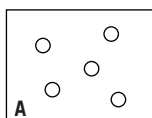
[2]

- b. Explain, in terms of moving particles, why dust particles in still air appear to move about in an irregular way.

[3]

- c. The diagrams show four substances A, B, C, and D. Classify these as single atoms, molecules, or ions.

[4]



1. Describe the general properties of liquids and gases in terms of (i) their volume and (ii) how they spread out.

liquids (i) (ii) [2]

gases (i) (ii) [2]

2. Statements A, B, C, and D are about the properties of solids liquids or gases. For each statement deduce the correct state of matter: solid, liquid, or gas.

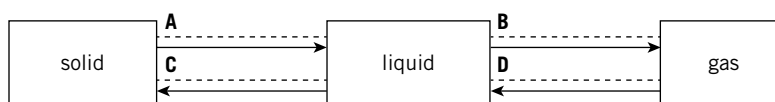
A It takes the shape of its container and has a surface.

B It spreads everywhere throughout the container.

C It has a definite shape.

D It can be poured onto a flat surface, where it spreads out completely. [4]

3. Complete the diagram by writing the names of the changes of state A, B, C, and D.



[4]

4. The table shows the melting points and boiling points of three substances.

Substance	Melting point / °C	Boiling point / °C
ethanol	-117	79
methane	-182	-164
naphthalene	81	218

a. Which substance has the lowest melting point? [1]

b. Which substance is a solid at room temperature? Explain your answer.

..... [2]

c. Which substance is a liquid at room temperature? Explain your answer.

..... [2]

5. a. Iodine melts at 114 °C and boils at 184 °C. Explain why iodine seems to change directly from a solid to a gas when you heat a crystal of iodine in a boiling tube. [2]

b. Suggest how you could show that iodine does form a liquid at room pressure. [2]

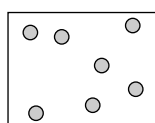
1. a. Use the correct words from the list to complete the sentences.

apart attraction fixed highest inside irregular lattice lowest
repulsion rotate strong surface together vibrate weak

The particles in a solid are arranged in a pattern (.....). The forces of between the particles are enough to keep them and so the particles only When a liquid evaporates, the particles with the energy leave the of the liquid first.

[8]

- b. Box A shows the arrangement of 7 particles in a gas. Complete the boxes B and C to show the arrangement of 16 particles in a solid and 16 particles in a liquid.



A (gas)



B (solid)



C (liquid)

[4]

- c. Complete these sentences correctly by writing the words *gas*, *liquid*, or *solid* in the spaces provided.

The forces of attraction between the particles in a are stronger than those between particles but weaker than those between the particles in a Particles in a only vibrate. Particles in a move more slowly than those in a

[6]

- d. Describe the difference between boiling and evaporation.

.....
.....

[2]

- e. For each of the changes i to iv state whether energy is absorbed or released.

- i. Bromine melts
- ii. Water freezes
- iii. Gaseous sulfur changes to solid sulfur
- iv. Ethanol boils [4]

Extension

- f. Arsenic changes directly from solid to gas at 613 °C. Describe what happens to the particles of arsenic in terms of their arrangement, separation, and motion during this change of state.

[3]

- g. Silicon melts at 1410 °C. Phosphorus melts at 44 °C. Explain the difference in these melting points by referring to forces between the particles and energy.

[4]

1. Complete the following sentences about a cooling curve using words from the list.

constant decreases freezes kinetic released temperature

When a liquid above room temperature cools, the energy of the particles The of the liquid falls. At the melting point, the temperature stays for a time. This is because thermal energy (heat) is being when a liquid [6]

2. The diagram shows a heating curve for substance T.

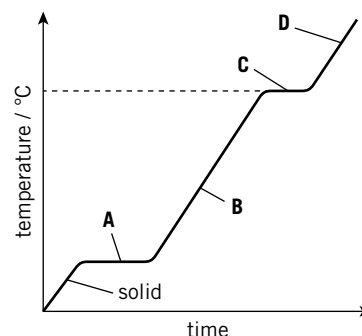
What is the physical state or states of T at the following points?

A [1]

B [1]

C [1]

D [1]



3. When a solid is heated, the temperature increases at first and then remains constant for a short time before increasing again. Explain why the temperature increases, then remains constant.

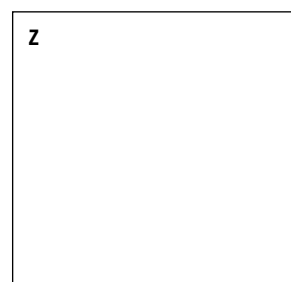
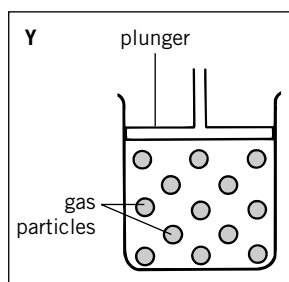
.....

 [4]

4. Draw a cooling curve to show how the temperature changes when steam at 120 °C is cooled slowly until ice is formed at –10 °C. On your curve show the melting and boiling points of water.

[4]

1. Box Y shows particles of gas in a container with a plunger.



- a. Draw a diagram in box Z to show what happens when the gas is compressed. [1]
- b. Use the kinetic particle theory to explain why the pressure in Z is more than the pressure in Y.

..... [3]

- c. What happens to the pressure when the temperature decreases at constant volume?

..... [1]

2. The table shows how the volume of a gas changes with temperature and pressure.

	Volume of gas at different temperatures / cm ³			
Pressure / atm	20 °C	40 °C	80 °C	160 °C
1	60	64	72	88
2	30	32	36	44
4	15	16	18	22

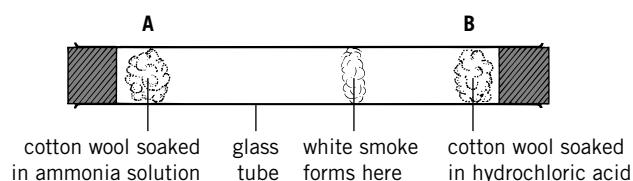
- a. Describe exactly how the volume varies with pressure when the temperature is constant.

..... [2]

- b. Describe how the volume varies with temperature when the pressure is constant.

..... [1]

3. A diffusion experiment is set up as shown.



- a. Ammonia solution forms ammonia gas. Hydrochloric acid forms hydrogen chloride gas. Explain why the white solid forms and why it is closer to B than A.

..... [3]

- b. Use books or the internet to find other gases that could replace hydrochloric acid in this experiment. [2]

- c. Methylamine reacts with hydrochloric acid in a similar way to ammonia. The relative molecular mass of hydrochloric acid is 36.5. The relative molecular mass of methylamine is 31. How does the position of the white ring change when methylamine is used? Explain your answer. [3]