Pearson Edexcel

Additional Assessment Materials Summer 2021

Pearson Edexcel GCSE in Chemistry (1CH0) Foundation

Resource Set Topic D: States of matter and mixtures

Questions

(Public release version)

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Additional Assessment Materials, Summer 2021

General guidance to Additional Assessment Materials for use in 2021

Context

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an **optional** part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

Purpose

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

10 (a) Hydrogen burns in air at a temperature well above 100 °C to form water.

(i) The boiling points of hydrogen and water are shown in Figure 15.

	boiling point in °C
hydrogen	–253
water	100

Figure 15

Use this information to add the missing state symbols to the equation for the reaction taking place as the hydrogen burns.

(2)

$2H_2(\text{g}) + O_2(g) \rightarrow 2H_2O(\text{g})$

6 An ink is a mixture of coloured substances dissolved in water.

(a) Which method is used to separate the coloured substances in the ink?

(1)

☒ **A** chromatography

☒ **B** crystallisation

☒ **C** filtration

☒ **D** fractional distillation

(b) The apparatus shown in Figure 9 can be used to separate water from ink.

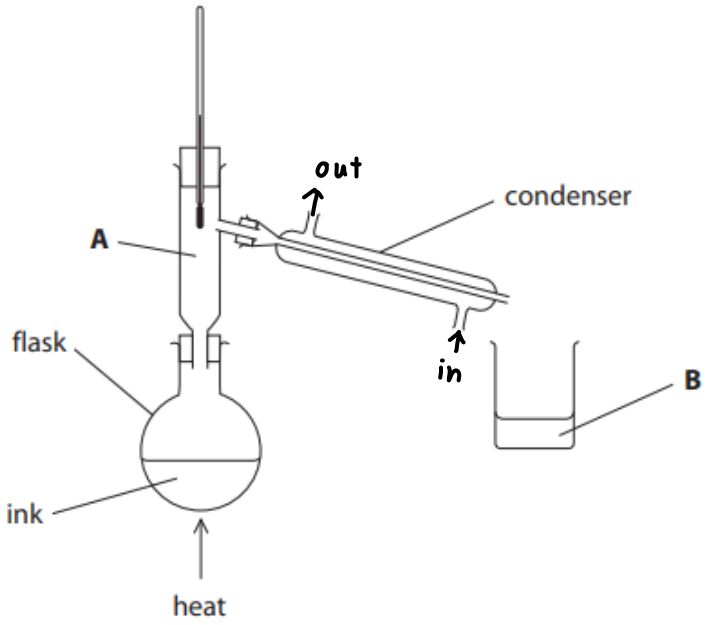


Figure 9

(i) Cold water flows through the condenser.

On Figure 9 use arrows to show where the water should flow in and where it should flow out.

(1)

(ii) Explain why a condenser is used.

(2)

A condensor is used to cool down the vapour so that it can be collected in the beaker.

(iii) The flask was heated with a Bunsen burner.

Give the name of an alternative piece of apparatus that could be used to heat the flask.

(1)

electric heater

(c) The particles in the ink in the flask can be shown as in Figure 10.

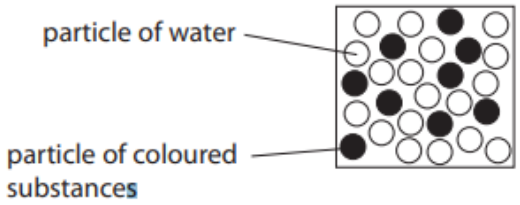
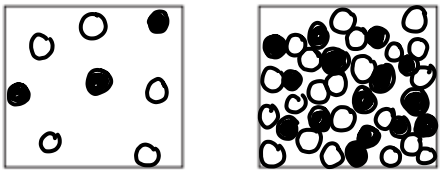


Figure 10

In the boxes below, draw the arrangement of particles that would be expected at **A** and **B** shown in Figure 9.

(2)



particles at **A** particles at **B**

(d) Changes of state between the three states of matter are shown in Figure 11.

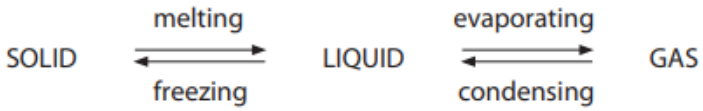


Figure 11

The changes shown are physical changes.

Explain why these changes are called physical changes rather than chemical changes.

(2)

There are no new substances made during these processes and they are reversible.

1 The three states of matter are solid, liquid and gas.

(a) What is the name of the change of state when a liquid changes into a solid?

(1)

☒ **A** condensation

☒ **B** evaporation

☒ **C** freezing

☒ **D** melting

(b) A gas was left to cool to form a liquid.

Figure 1 shows how the temperature of the substance changed with time.

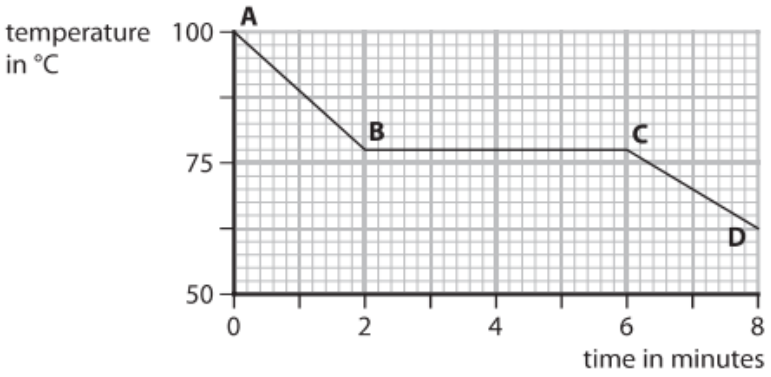


Figure 1

From **A** to **B** the substance is a gas.

From **C** to **D** the substance is a liquid.

(i) State the time when the gas first started to form a liquid.

(1)

2 ..... minutes

(ii) Calculate the number of minutes it took from the gas first starting to form a liquid until the substance was completely liquid.

(1)

.....

4 ..... minutes

(c) Figure 2 shows the melting points and boiling points of four substances, **W**, **X**, **Y** and **Z**.

substance	melting point in °C	boiling point in °C
W	−220	−188
X	−101	−34
Y	−7	59
Z	114	184

Figure 2

Using the information in Figure 2

(i) give the letter of the substance that is a solid at 20 °C

(1)

Z

(ii) give the letter of a substance that is a liquid at 50 °C

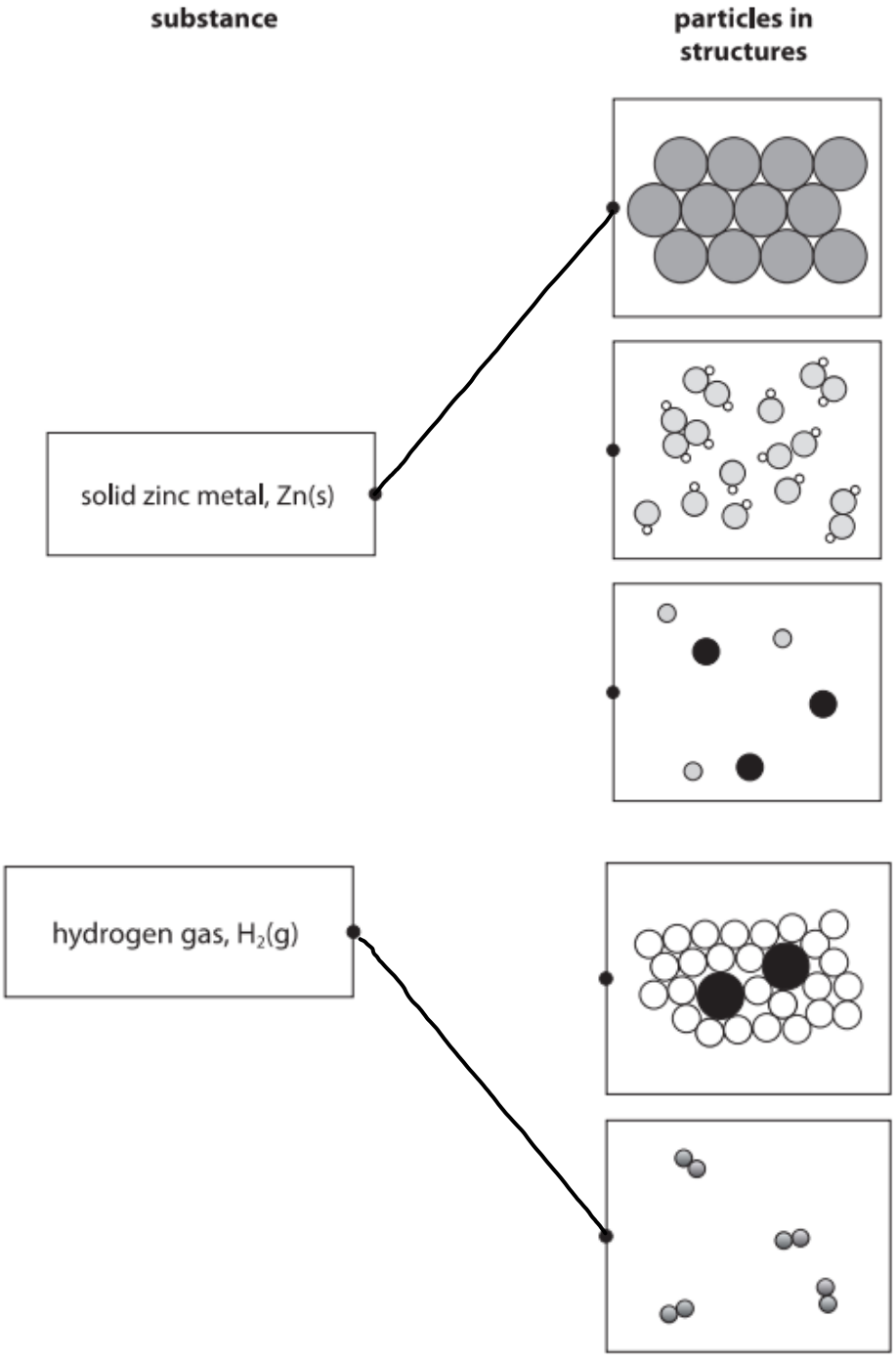
(1)

Y

(d) The diagrams below show particles in five different structures.
The different circles show different particles.

Draw one straight line from each substance to its structure.

(2)



4 Mixtures of substances can be separated using different techniques.

(a) Which of the following is a mixture of substances?

(1)

☒ **A** air

☒ **B** carbon dioxide

☒ **C** gold

☒ **D** titanium

(b) Figure 5 shows the apparatus that a student set up to obtain pure water from ink.

There are three mistakes in the way the apparatus has been set up.

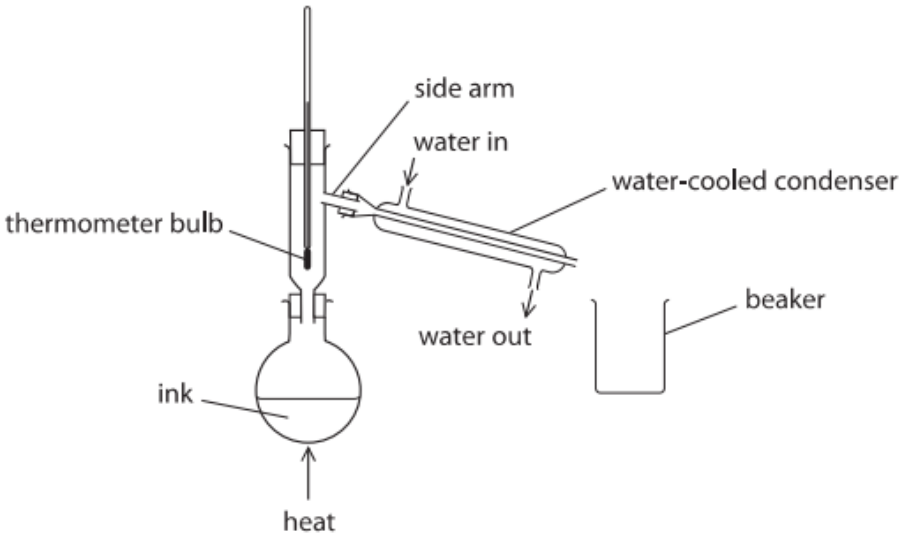


Figure 5

(i) One mistake is that the bulb of the thermometer is too low.

The bulb of the thermometer should be level with the side arm.

Give a reason why the bulb of the thermometer should be level with the side arm.

(1)

To measure the temperature of the gases as they enter the condensor accurately.

(ii) State **one** other mistake in Figure 5.

(1)

water should enter and exit in the opposite way.

(c) Paper chromatography is used to separate the substances in five different food colourings, **P**, **Q**, **R**, **S** and **T**.

Figure 6 shows the chromatogram at the end of the experiment.

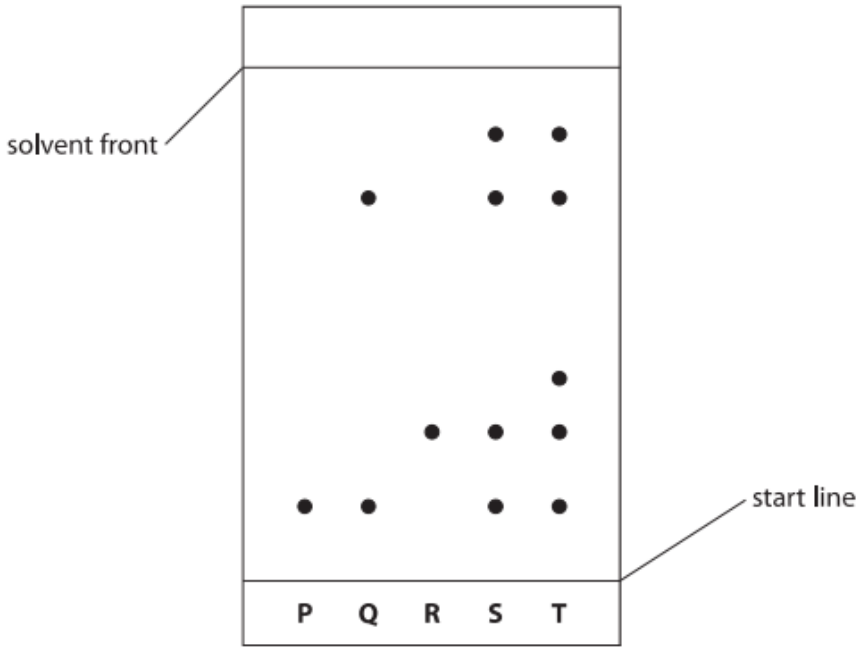


Figure 6

(i) The steps needed to carry out the chromatography experiment are listed below. They are not in the correct order.

1 leave the solvent to rise up the paper
2 put solvent in the beaker
3 draw a start line on the piece of paper
4 place the paper in the beaker
5 remove the paper when the solvent is near the top
6 put small spots of the food colourings on the start line

List the steps in the correct order.

The first two steps have been done for you.

(2)

2	3	6	4	1	5

(ii) Explain, using Figure 6, which food colouring contains the greatest number of coloured substances.

(2)

T. It has the most number of spots.

(iii) During chromatography of the food colourings, the solvent front moved 8.00 cm and the food colouring **R** moved 2.30 cm.

Calculate the R_f value for food colouring **R**.
Give your answer to two significant figures.

(2)

R_f value $= \frac{2.30}{8.00}$

$= 0.2875$

$\simeq 0.29$

R_f value = 0.29

4

(d) Figure 5 shows the changes of state for gallium and the arrangement of particles in liquid gallium.

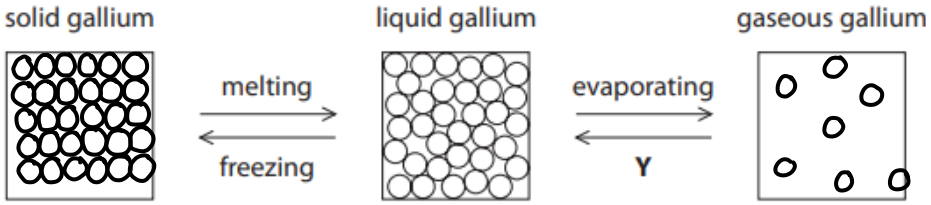


Figure 5

(i) Complete the boxes for solid gallium and gaseous gallium by drawing the arrangement of the particles in each of these physical states.

(2)

(ii) Give the name of the change of state labelled **Y** in Figure 5.

condensing

(1)

.....

TOTAL FOR PAPER IS 30 MARKS