GuideMyGrades

YOUR GOALS. OUR EXPERTISE.

EDEXCEL GCSE CHEMISTRY: QUESTIONS BY TOPIC

States of Matter and Mixtures (2)

GCSE Chemistry (Higher) Topic 2

3 questions · 27 marks · Mark schemes included

Pearson Edexcel GCSE (9-1) Chemistry 1CH0, Higher Tier, June 2018 - June 2025

guidemygrades.com
@Guidemygrades
@Guidemygrades
@Guidemygrades
info@guidemygrades.com
Piccadilly Business Centre, Unit C, Aldow Enterprise Park
Blackett Street, Manchester, M12 6AE

HOW TO USE THIS BOOKLET

Questions run from the lowest mark tariff to the highest, so similar questions sit together.
Click any row below to jump straight to that question.
On every question page, click ANSWER in the top-right corner to jump to its mark scheme.
Diagrams, graphs, tables and data are printed exactly as they appeared in the original papers.

	QUESTION	SOURCE	MARKS	PAGE
1.	**Q5**	Paper 1 June 2018	9	**4**
2.	**Q5**	Paper 1 November 2020	9	**6**
3.	**Q3**	Paper 1 November 2021	9	**8**

QUESTIONS

3 questions · 27 marks · lowest tariff first

9-MARK QUESTIONS

3 questions in this booklet

5 (a) Which of the following substances will be a solid at 20 °C and will melt when placed in a beaker of hot water at 80 °C?

(1)

	melting point in °C	boiling point in °C
☒ **A**	122	249
☒ **B**	–7	59
☒ **C**	30	2403
☒ **D**	–32	27

(b) A student set up the apparatus shown in Figure 4 to obtain pure water from sea water by distillation.

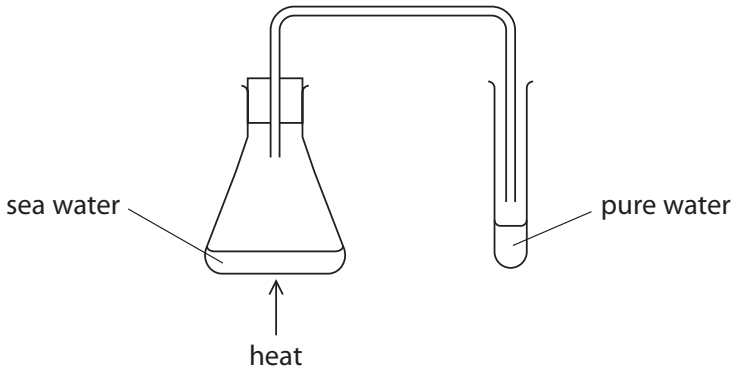


Figure 4

(i) Explain how the water in sea water separates to produce the pure water in this apparatus.

(2)

.....

.....

.....

.....

(ii) Explain how the apparatus could be improved to increase the amount of pure water collected from the same volume of sea water.

(2)

.....

.....

.....

.....

(c) A substance is heated at a constant rate and its temperature is taken every minute. During the heating, the substance undergoes one change of state.

The results are shown on the graph in Figure 5.

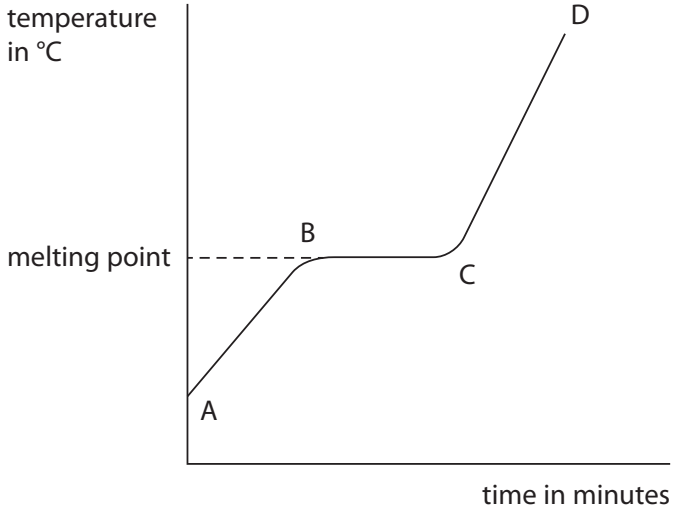


Figure 5

Explain the shape of the graph in terms of the changes in the movement and arrangement of the particles as the substance is heated.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 5 = 9 marks)

5 (a) A sample of rock salt contains a mixture of sodium chloride and some insoluble substances.

The rock salt is added to water and the mixture stirred.

The mixture is then filtered to obtain a filtrate of sodium chloride solution.

(i) Draw a labelled diagram of the apparatus used to filter the mixture and collect the sodium chloride solution.

(2)

(ii) Describe how a sample of pure, dry sodium chloride crystals can be obtained from the filtrate.

(3)

.....

.....

.....

.....

.....

.....

(b) Inks contain coloured dyes.
Samples of four inks, **W**, **X**, **Y** and **Z**, were separated using paper chromatography.
Figure 5 shows the chromatogram obtained.

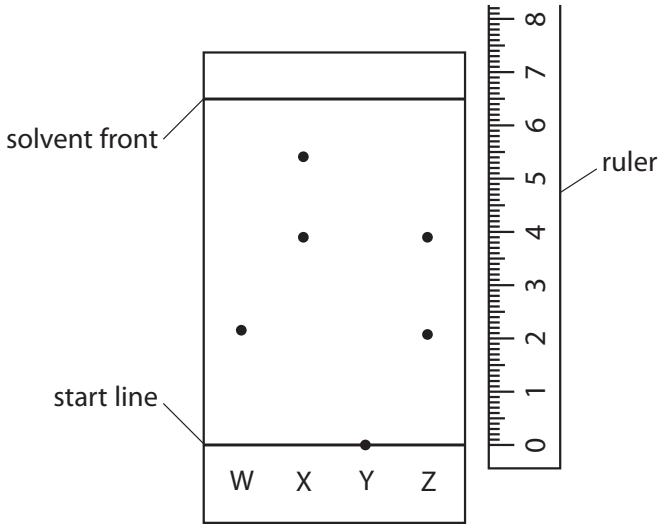


Figure 5

(i) In the experiment, the solvent front moved 6.5 cm.
Calculate the R_f value of the dye that is present in both inks **X** and **Z**.

(1)

.....

.....

R_f = ...

(ii) State what could be changed in the experiment to make the R_f value more accurate.

(1)

.....

.....

(iii) In this experiment, ink sample **Y** did not move from the start line.
Explain a change to the experiment that would be needed to separate the dyes in ink sample **Y**.

(2)

.....

.....

.....

(Total for Question 5 = 9 marks)

3 (a) A sample of potable water contains impurities.

Why is this sample of water potable even though it contains impurities?

(1)

- ☒ **A** the impurities have no smell
- ☒ **B** the impurities are colourless
- ☒ **C** the impurities are harmless
- ☒ **D** the impurities are soluble

(b) Waste water can be used to produce drinking water.
The processes used include sedimentation, filtration and chlorination.

(i) What is sedimentation?

(1)

- ☒ **A** the waste water is heated so the impurities evaporate
- ☒ **B** the waste water has an acid added to remove impurities
- ☒ **C** the impurities in the waste water settle to the bottom of their container
- ☒ **D** the impurities in the waste water are bleached

(ii) State why the waste water is filtered.

(1)

.....

.....

(iii) State the reason for chlorination.

(1)

.....

.....

.....

(c) Some salts can be added to waste water to remove impurities.
In an experiment, different masses of salt **A** were added to 1000 cm^3 samples of waste water.
The experiment was repeated with salt **B**.
The percentages of impurities removed from the waste water are shown in Figure 4.

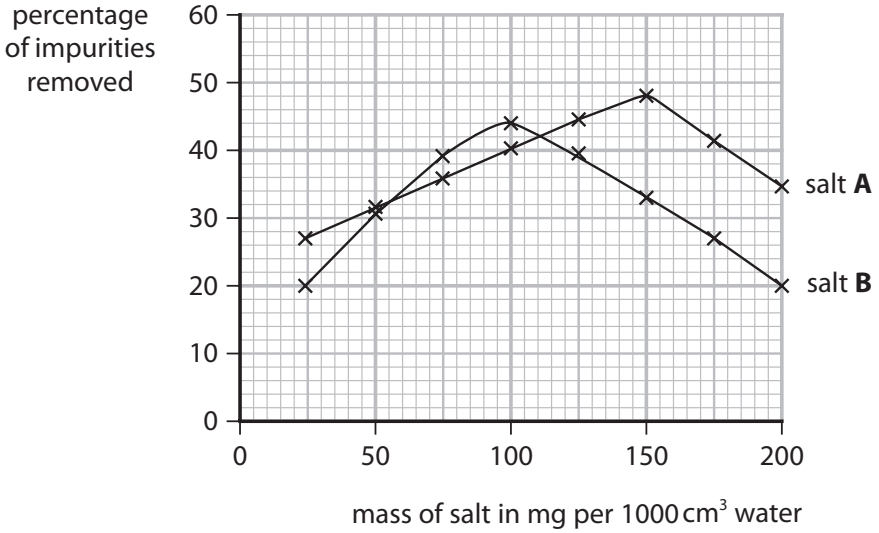


Figure 4

It was concluded that the best way to purify 1000 cm^3 of the waste water is to add 100 mg of salt **B**.

Use the information about salt **A** and salt **B** in Figure 4 to evaluate this conclusion.

(3)

.....

.....

.....

.....

(d) Waste water may contain phosphate ions, PO_4^{3-}.

Aluminium ions react with phosphate ions to form aluminium phosphate.

Complete the ionic equation for the formation of aluminium phosphate in this reaction.

(2)

..... + PO_4^{3-} → .....

(Total for Question 3 = 9 marks)

MARK SCHEMES

official Pearson Edexcel mark schemes

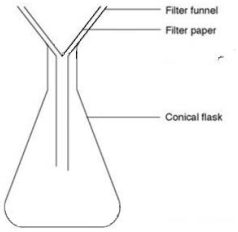
Question Number	Answer	Mark
5(a)	**C** 30 2403 **The only correct answer is C** ***A*** *is not correct because it will be a solid above 80 °C* ***B*** *is not correct because it will be a liquid at 20 °C and gas at 80 °C* ***D*** *is not correct because it will be a liquid at 20 °C and gas at 80 °C*	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
5(b)(i)	An explanation linking • water {boils / evaporates} (to form steam / water vapour / leaving salt behind) (1) • (steam / water vapour) condenses (to form pure water) (1) allow alternative wording for evaporate and condense	ignore sea water evaporates sea water evaporates and condenses scores 1 overall mark independently	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	An explanation linking • use a (Liebig) condenser / surround test tube with (beaker of) {iced/cold} water / wrap delivery tube with cold cloth (1) • to increase effectiveness of cooling / amount of condensation / remove the heat energy more effectively / ensure all the water vapour condenses (1)	ignore anti bumping granules / fractionating column allow alternative suitably described methods / prevent water vapour escaping / cools water vapour faster ignore sea water vapours a closed system scores 0 overall mark independently	**(2)** AO 3 3b

Question Number	Answer	Additional guidance	Mark
5(c)	An explanation linking from B to C: graph flat because • particles in solid use energy to {break out of lattice / break (intermolecular) bonds (between particles) / particles becoming randomly arranged / turn solid to liquid} (1) and any three from from A to B: graph rises because • particles in solid in a lattice / fixed (mean) positions (1) • vibrate more (rapidly) (as temperature increases) (1) from C to D: graph rises because • particles in liquid move past one another / randomly (1) • particles move more (rapidly) (as temperature increases) (1)	 may be shown as a diagram / on graph may be shown as a diagram / on graph ignore references to gas / evaporation / boil	**(4)** AO 3 2a AO 3 2b

Total for question 5 = 9 marks

Question number	Answer	Additional guidance	Mark
5(a)(i)	 (2) OR diagram: funnel with separate filter paper and (conical) flask (1) labels: (filter) **funnel and filter paper and** (conical) flask (1)	reject diagram with funnel 'closed' at bottom/top but can score MP2 allow 'closed' filter paper allow any suitable apparatus for conical flask e.g. beaker 'flask' label should be appropriate to apparatus drawn ignore labelling of filtrate/residue etc	(2)

Question number	Answer	Additional guidance	Mark
5(a)(ii)	a description including any three from: • heat solution (to concentrate) (1) then either • leave solution {in warm place / to crystallise} (1) • scrape crystals (from container) / pat dry between filter papers (1) OR • leave solution {to crystallise / to cool} (1) • filter off crystals / decant liquid from the crystals / pat dry between filter papers / dry in oven (1)	if no other marks are scored , allow max 1 for crystallisation (1)	(3)

Question number	Answer	Additional guidance	Mark
5(b)(i)	0.6 or $\frac{3.9}{6.5}$		(1)

Question number	Answer	Additional guidance	Mark
5(b)(ii)	longer paper/ different {medium/ paper}	ignore repeat experiment ignore more accurate ruler	(1)

Question number	Answer	Additional guidance	Mark
5(b)(iii)	An explanation linking use a different solvent (1) so that the ink will dissolve (1)	 allow any suitable named solvent allow because the ink does not dissolve in water	(2)

Question number	Answer	Mark
3(a)	**C** the impurities are harmless **C** is the only correct answer. **A**, **B** and **D** are incorrect as the properties are not relevant	(1) AO2

Question number	Answer	Mark
3(b)(i)	**C** the impurities in the waste water settle to the bottom of their container **C** is the only correct answer. **A**, **B** and **D** are incorrect because no sediment is formed	(1) AO1

Question number	Answer	Additional guidance	Mark
3(b)(ii)	to remove {insoluble substances / solids}	allow named solid substances eg sand ignore materials removed by initial screening eg twigs, debris etc ignore to produce clean/pure water reject remove bacteria	(1) AO1

Question number	Answer	Additional guidance	Mark
3(b)(iii)	to kill {bacteria / microorganisms}	ignore to cleanse, purify, clean, make safe allow to remove bacteria / germs	(1) AO1

Question number	Answer	Additional guidance	Mark
3(c)	An answer including • best amount of **A** is 150 (mg) (1) • 150 mg **A** removes more than 100 (mg) **B** (1) • so it is better to use salt **A** than salt **B** (1) OR • because (at peak activity) **B** removes a higher percentage per gram than **A** (1) • so less salt would be needed / more efficient (1) • so it is better to use salt **B** than salt **A** (1) OR • 150 mg of A removes 48% impurities • 100 mg of B removes 44% impurities • so salt **A** is better (than salt **B)** as more impurities are removed (1) OR • 100 mg of A removes 40% impurities • 100 mg of B removes 44% impurities • so salt B is better (than salt A**)** as more impurities are removed for same mass of salt (1)	ignore incorrect units of mass allow so salt B is more effective in smaller quantities	**(3)** **AO3**

Question number	Answer	Additional guidance	Mark
3(d)	$Al^{3+} + PO_4^{3-} \rightarrow AlPO_4$ (2) Al^{3+} (1) $AlPO_4$ (1)	allow any neutral aluminium phosphate formula based on their aluminium ion. allow $Al^{3+}PO_4^{3-}$	**(2)** **AO2**

(Total for question 3 = 9 marks)