AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.3.2.5

Concentration of solutions

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**11**
Available paper years	**2007–2025**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.3.2.5 Concentration of solutions

Answer 01 · Mark scheme

June 2007 | CHY1B | Original Q9 | Legacy

Nine	**3**	**4**	**2**	**3**

4.3.2.5 Concentration of solutions

Answer 02 · Mark scheme

January 2008 | CHY3F | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
(a)(i)	smooth curve through all points over full range finishing between 6.4 and 5.4 at 50°C		1
(a)(ii)	5.6 **or** from their graph		1
(a)(iii)	10 – 5.6 = 4.4	their reading at 15° - their a(ii) answer from their figures	1 1
(a)(iv)	yes: the value at 15°C because have values either side owtte **or** no: more error in a smaller number owtte	accept converse answers based on 50°C accept converse answers based on 50°C	1
(b)(i)	balanced view / involving people / debate / gather information / democracy	owtte any sensible answer ignore 'trout might die'	1
(b)(ii)	undue weight / bias may be given to high status and very experienced people less experienced / lower status may reduce status of enquiry	owtte any sensible answer	1

continued…

CHY3F

Question 6 continued…

question	answers	extra information	mark
(b)(iii)	(A) Management: any **one** from: • small amounts may be fine • can cope for short periods • could spread throughout the day • fish still getting (enough) oxygen • rate of photosynthesis could be increased to balance loss of oxygen • water will cool down (quickly)	any sensible answer	1
	(B) Council: any **one** from: • any rise in temperature would reduce / affect (dissolved) oxygen • water will still be too hot • trout will die above 26°C	any sensible answer	1
total			9

4.3.2.5 Concentration of solutions

Answer 03 · Mark scheme

Question 6

question	answers	extra information	mark
6(a)	the ions can move / travel / flow / are free **or** the ions carry the charge / current	accept particles / they for ions allow delocalised ions ignore delocalised / free electrons ignore references to collisions accept converse with reference to solid ignore ions carry electricity	1
6(b)	any **one** from: • because they are negative / anion • opposite charges / attract	allow Cl^- ignore chlorine	1
6(c)	13		1
6(d)(i)	reasonable attempt at straight line which misses the anomalous point	must touch all five crosses do **not** allow multiple lines	1
6(d)(ii)	40	ignore 2.2	1

Question 6 continues on the next page

CHY2F

Question 6

question	answers	extra information	mark
6(d)(iii)	any **two** sensible errors from: • gas escapes • weighing error • error in measuring (volume / amount) of hydrogen • error in measuring (volume / amount) of water • incorrect concentration • timing error • change in voltage / current • change in temperature • recording / plotting error	ignore systematic / human / apparatus / zero /experimental / random / measurement / reading errors unless qualified allow NaCl not measured correctly allow error in measuring volume / scale for **1** mark if neither hydrogen or water mentioned allow NaCl not fully dissolved **or** spilled **or** impure allow faulty power supply	2
6(d)(iv)	any **one** from: • repeat the experiment • results compared with results from /other students / other groups / other laboratories / internet / literature. • results compared with another method	ignore 'do more tests'	1
6(d)(v)	increases owtte	allow directly proportional or positive correlation allow rate / it is faster / quicker	1
Total			**9**

4.3.2.5 Concentration of solutions

Answer 03 · Mark scheme

January 2011 | CHY2F | Original Q6 | Legacy

CHY2F

4.3.2.5 Concentration of solutions

Answer 04 · Mark scheme

November 2020 | 8462/1F | Original Q10

Question 10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	(total) mass before = 156.76 (g) **and** (total) mass after = 156.76 (g) **or** increase in mass of beaker **A** and contents = 29.96 (g) **and** decrease in mass of beaker **B** and contents = 29.96 (g) (so) the mass of products equals the mass of the reactants **or** (so) there is no change in mass during the reaction	allow 78.26 + 78.50 = 156.76 **and** 108.22 + 48.54 = 156.76 allow 108.22 – 78.26 = 29.96 **and** 48.54 – 78.50 = – 29.96 allow (so) no atoms were lost or made during the reaction	1 1	AO2 AO1 4.3.1.1
10.2	filter / filtration	allow a description of filtration	1	AO2 4.1.1.2
10.3	sodium nitrate (solution) **or** silver nitrate (solution) **or** sodium iodide (solution)	allow correct formulae allow sodium / nitrate / silver / iodide ions	1	AO2 4.1.1.2
10.4	to remove / evaporate the water	allow to dry (the solid)	1	AO3 4.1.1.2

Question 10 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.5	(total M_r = 170 + 150) = 320	allow (235 + 85) = 320	1	AO2 4.3.3.2
	(% atom economy =) $\frac{235}{320} \times 100$	allow correct use of incorrectly calculated total M_r	1	
	= 73.4375 (%)		1	
	= 73.4 (%)	allow an answer correctly calculated to 3 significant figures from an incorrect percentage calculation which uses the values in the question	1	
10.6	any **one** from: • for sustainable development • for economic reasons • to produce a high(er) percentage of useful product	allow to reduce waste	1	AO1 4.3.3.2
Total			**10**	

4.3.2.5 Concentration of solutions

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	(mass) balance (volume) measuring cylinder	allow scales allow burette / pipette	1 1	AO1 4.10.1.2 RPA 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	(mass of salt = 30.49 – 30.44 =) 0.05 (g salt) (mass of salt in 1000 cm^3 =) $\frac{1000}{50} \times 0.05$ = 1.0 (g) **alternative approach**: (volume ratio = $\frac{1000}{50}$) = 20 (1) (mass of salt in 1000 cm^3) = (30.49 – 30.44) × 20 (1) = 1.0 (g) (1)	 allow correct use of incorrectly determined mass of salt allow correct use of incorrectly determined volume ratio	1 1 1	AO2 4.10.1.2 RPA8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	heat the evaporating dish and salt again measure the mass of the evaporating dish and salt again		1 1	AO3 4.10.1.2 RPA 8

Question 2 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	(no condenser) (more) steam escapes **or** less steam condenses	allow converse for condenser allow water vapour for steam	1	AO1
	(because) cooling / condensing is less efficient **or** (because) a (liebig) condenser is not used	allow (because) cooling / condensing is slower allow (because) cold water is not used for cooling / condensing	1	AO3 4.1.1.2 4.10.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	(distilled) water is pure	allow microbes are destroyed (by distillation)	1	AO3 4.8.1.1 4.10.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	using chlorine using ozone		1 1	AO1 4.10.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.7	pH 7		1	AO2 4.4.2.4 4.10.1.2 RPA8

Total			13

4.3.2.5 Concentration of solutions

Answer 06 · Mark scheme

November 2021 | 8462/2F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	flame emission spectroscopy flame test		1 1	AO1 4.8.3.1 4.8.3.7 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	white		1	AO2 4.8.3.2 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	barium chloride (solution)		1	AO1 4.8.3.5 RPA7

Question 6 continued

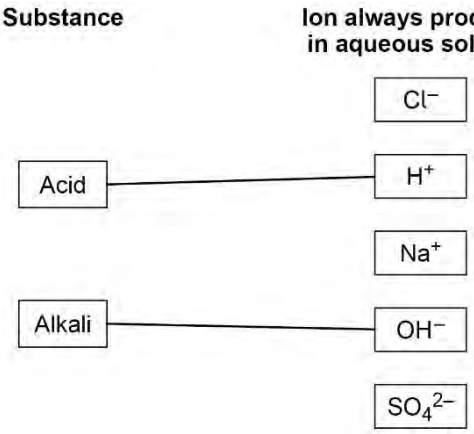
Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	(conversion) (800 cm^3 = $\frac{800}{1000}$ =) 0.8 (dm^3) (mass =) 0.8 × 258 (g) = 206.4 (g) = 206 (g) **alternative approach:** (conversion) (258 g/dm^3 = $\frac{258}{1000}$ =) 0.258 (g/cm^3) (1) (mass =) 0.258 × 800 (g) (1) = 206.4 (g) (1) = 206 (g) (1)	 allow correct use of incorrect / no volume conversion allow an answer correctly calculated to 3 significant figures from an incorrect calculation which uses the values in the question allow correct use of incorrect / no concentration conversion allow an answer correctly calculated to 3 significant figures from an incorrect calculation which uses the values in the question	 1 1 1 1	AO2 4.3.2.5
Total			**8**	

4.3.2.5 Concentration of solutions

Answer 07 · Mark scheme

June 2023 | 8462/1F | Original Q2

Question 2

Question	Answers	Mark	AO / Spec. Ref.
02.1	 do **not** accept more than **one** line from a box on the left	1 1	AO1 4.4.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	alkaline		1	AO1 4.4.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	pipette		1	AO1 4.4.2.5 RPA2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	burette		1	AO1 4.4.2.5 RPA2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	trial 3		1	AO3 4.4.2.5 RPA2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	any **one** from: • (hydrochloric acid) not added drop by drop • did not swirl • did not rinse apparatus (after previous trial) • did not use a white tile • misread pipette / burette	allow measured out too much alkali	1	AO3 4.4.2.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.7	$\left(25.0\ cm^3 = \frac{25.0}{1000} =\right)\ 0.025\ (dm^3)$		1	AO2 4.3.2.5
	(mass =) 0.025 × 4.00	allow correct use of incorrect / no conversion of volume	1	
	= 0.1 (g)		1	
	alternative approach:			
	$\left(\text{concentration} = \frac{4.00}{1000} =\right)$ $0.004\ (g/cm^3)$ (1)			
	(mass =) 0.004 × 25.0 (1)	allow correct use of incorrectly determined concentration in g/cm^3		
	= 0.1 (g) (1)			

Total Question 2	10

4.3.2.5 Concentration of solutions

Answer 08 · Mark scheme

June 2024 | 8462/1F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	displacement		1	AO1 4.4.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	(percentage =) $\frac{63.5}{159.5} \times 100$		1	AO2 4.3.1.2
	= 39.81191 (%)		1	
	= 39.8 %	allow an answer correctly rounded to 3 significant figures from an incorrect calculation which uses both the values in the question	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	volume of copper sulfate solution		1	AO1 4.5.1.1 RPA4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	0.8(0) g		1	AO3 4.5.1.1 RPA4

4.3.2.5 Concentration of solutions

Answer 08 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	(maximum temperature change) = 47 – 22 (ºC) = 25 (ºC)	 allow correct use of incorrectly determined value(s) from the graph	1 1	AO2 4.5.1.1 RPA4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	(conversion 25 cm^3 =) 0.025 dm^3 (concentration =) $\frac{6.75}{0.025}$ (g/dm^3) = 270 (g/dm^3)	 allow correct use of an incorrectly determined or unconverted volume	1 1 1	AO2 4.3.2.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	line of best fit using the first five points line of best fit using the last four points	max **1** mark if the lines do not intersect	1 1	AO2 4.5.1.1 RPA4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.8	energy is **taken in from** the surroundings so the reaction is **endothermic**		1	AO3 4.5.1.1 RPA4

Total Question 3	14

4.3.2.5 Concentration of solutions

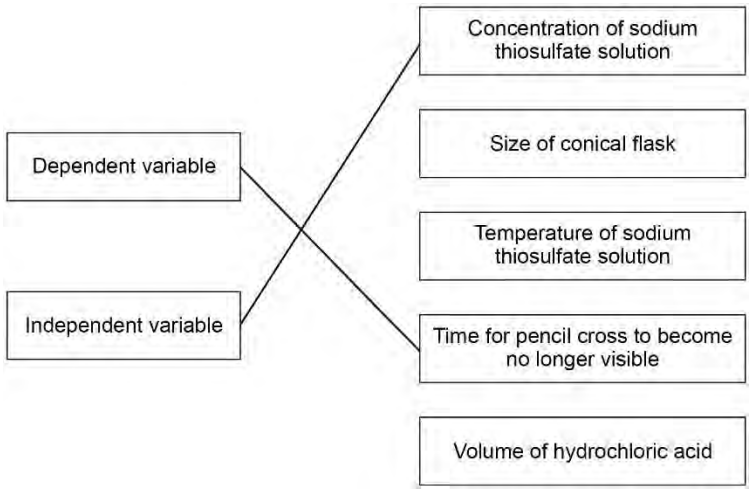
Answer 09 · Mark scheme

June 2024 | 8462/2F | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	volume (of reactants) is 90 cm^3 (so conical) flask will overflow	allow volume (of reactants) is greater than 50 cm^3 allow (so) solutions will not fit (in conical flask)	1 1	AO3 4.6.1.2 RPA5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	measuring cylinder	allow (volumetric / graduated) pipette allow burette	1	AO1 4.6.1.2 RPA5

Question	Answers	Mark	AO / Spec. Ref.
05.3	 allow **1** mark if dependent variable and independent variable are identified the wrong way round do **not** accept more than **one** line drawn from a box on the left	1 1	AO1 4.6.1.2 RPA5

4.3.2.5 Concentration of solutions

Answer 09 · Mark scheme

June 2024 | 8462/2F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	the time taken will increase		1	AO3 4.6.1.2 RPA5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	32 g/dm^3		1	AO3 4.6.1.1 4.6.1.2 RPA5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	the particles are closer together the particles collide more frequently		1 1	AO1 4.6.1.3 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.7	decreases increases		1 1	AO2 4.6.1.2 4.6.1.3 RPA5

Total Question 5	**11**

4.3.2.5 Concentration of solutions

Answer 10 · Mark scheme

June 2024 | 8462/2F | Original Q8

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	(test) flame test (result) yellow (flame) **OR** (test) flame emission spectroscopy (1) (result) lines match sodium spectrum (1)	 allow FES	1 1	AO1 4.8.3.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.2	(test) (add acidified) silver nitrate (solution) (result) white precipitate	 MP2 is dependent upon the award of MP1	 1 1	AO1 4.8.3.4 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	to ensure that all the water has evaporated		1	AO3 4.10.1.2 RPA8

4.3.2.5 Concentration of solutions

Answer 10 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.4	mass of evaporating dish and dry contents – mass of empty evaporating dish		1	AO1 4.10.1.2 RPA8

4.3.2.5 Concentration of solutions

Answer 10 · Mark scheme

June 2024 | 8462/2F | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	(mean concentration of NaCl =) $\frac{35.2 + 34.6 + 36.4 + 33.8}{4}$ **or** $\frac{140}{4}$ = 35.0 (g/dm^3)	allow **1** mark for $\frac{35.2 + 34.6 + 33.8}{3} = 34.5$	1 1	AO2 4.10.1.2 RPA8
	(mean concentration of Na^+ =) $35.0 \times \frac{39.3}{100}$	allow correct use of an incorrectly determined mean concentration of sodium chloride	1	
	= 13.8 (g/dm^3)	allow 13.755 correctly rounded to at least 3 significant figures	1	
	alternative approach 1:			
	(total concentration of NaCl = 35.2 + 34.6 + 36.4 + 33.8 = 140 total concentration of Na+ =) $140 \times \frac{39.3}{100}$ (1) = 55.02 (g/dm^3) (1)	allow **1** mark for (35.2 + 34.6 + 33.8 = 103.6) $103.6 \times \frac{39.3}{100} = 40.71$		
	(mean concentration of Na^+ =) $\frac{55.02}{4}$ (1)	allow correct use of an incorrectly determined total concentration of Na^+		
	=13.8 (g/dm^3) (1)	allow 13.755 correctly rounded to at least 3 significant figures		

	alternative approach 2: (concentrations of Na^+ =) $35.2 \times \frac{39.3}{100}$ $34.6 \times \frac{39.3}{100}$ $36.4 \times \frac{39.3}{100}$ $33.8 \times \frac{39.3}{100}$ (1) = 13.83 13.60 14.31 13.28 (1) (mean concentration of Na^+ =) $\frac{13.83 + 13.60 + 14.31 + 13.28}{4}$ (1) =13.8 (g/dm^3) (1)	allow **1** mark if a concentration of 36.4 is treated as an anomaly and not used allow correct use of incorrectly determined concentration(s) of Na^+ allow 13.755 correctly rounded to at least 3 significant figures		

Total Question 8	**10**

4.3.2.5 Concentration of solutions

Answer 11 · Mark scheme

June 2025 | 8462/2F | Original Q8

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	(a burette is) more accurate (than a measuring cylinder)	allow (a burette has) a higher resolution ignore precise	1	AO3 4.10.1.2 RPA8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.2	the mass of (dissolved) solids		1	AO1 4.10.1.2 RPA8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	reheat (the evaporating basin and contents) (and reweigh) until constant mass	 allow for **2** marks heat to constant mass	1 1	AO3 4.10.1.2 RPA8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.4	subtract the mass of the (empty) evaporating basin from the mass of the evaporating basin and contents (at the end of the experiment)	allow subtract initial mass from the final mass	1	AO1 4.10.1.2 RPA8

4.3.2.5 Concentration of solutions

Answer 11 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	(allow mean mass =) $\frac{0.35 + 0.37 + 0.33 + 0.34}{4}$	(allow mean mass =) $\frac{1.39}{4}$	1	AO2 4.3.2.5 4.10.1.2 RPA8
	= 0.3475 (g)		1	
	(conversion 10 cm^3 =) 0.01 dm^3		1	
	(mean concentration =) $\frac{0.3475}{0.01}$	allow correct use of incorrectly determined mean mass allow correct use of incorrect / no conversion of volume	1	
	= 34.75 (g/dm^3)	allow 34.75 (g/dm^3) correctly rounded to at least 2 significant figures	1	
	alternative approach 1 (conversion 10 cm^3 =) 0.01 dm^3 (1)			
	(concentrations =) $\frac{0.35}{0.01}$ $\frac{0.37}{0.01}$ $\frac{0.33}{0.01}$ $\frac{0.34}{0.01}$ (1)	allow correct use of incorrect / no conversion of volume		
	= 35 37 33 34 (1)			
	(mean concentration =) $\frac{35 + 37 + 33 + 34}{4}$ (1)	(allow mean concentration =) $\frac{139}{4}$ allow correct use of incorrectly determined concentrations		
	= 34.75 (g/dm^3) (1)	allow 34.75 (g/dm^3) correctly rounded to at least 2 significant figures		

	alternative approach 2 using total mass and total volume (total mass = 0.35 + 0.37 + 0.33 + 0.34 =) 1.39 (g) (1) (total volume = 10 + 10 + 10 + 10 =) 40 cm^3 (1) (conversion 40 cm^3 =) 0.04 dm^3 (1) (mean concentration =) $\frac{1.39}{0.04}$ = 34.75 (g/dm^3) (1)	 allow correct use of incorrectly determined total mass allow correct use of incorrect / no conversion of total volume allow 34.75 (g/dm^3) correctly rounded to at least 2 significant figures		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.6	the samples were taken from different places		1	AO3 4.10.1.2

Total Question 8	**11**

4.3.2.5 Concentration of solutions

Answer 07 · Examiner comments

June 2023 | 8462/1F | Original Q2

Question 2 (low and standard demand)

02.1 Students found this question difficult, with only a fifth of students gaining both marks.

02.2 Three quarters of students knew that the solution would be alkaline.

02.3 Students found this question difficult, with two thirds of students selecting a beaker as a piece of equipment suitable for measuring 25.0 cm^3 of a solution. Students seemed unfamiliar with the use of a pipette to measure volumes accurately.

02.4 This was well answered, with the vast majority recognising a burette as the correct piece of equipment.

02.5 Nearly all students recognised Trial 3 as the anomalous result.

02.6 This question proved difficult, with only a quarter of students scoring the mark. Many concentrated on why Trial 3 was chosen, rather than a source of the inaccuracy. Those who did try to find a source of inaccuracy were often successful, with the acid not being added dropwise or too much sodium hydroxide being measured out, being the most popular answers.

02.7 Two thirds of students scored no marks on this question. Those who attempted to use the information given to convert their volume to dm^3 often scored at least two marks. There were many answers where the figures 1000, 4 and 25 had been manipulated almost at random; 160 was a common response.

4.3.2.5 Concentration of solutions

Answer 08 · Examiner comments

June 2024 | 8462/1F | Original Q3

Question 3 (low and standard demand)

03.1 Two thirds of students recognised this as a displacement reaction. Combustion proved surprisingly popular.

03.2 Nearly a half of students scored 2 or 3 marks on this calculation. A common error was to give the answer to three decimal places instead of three significant figures. A few students thought that 39.81 should be rounded up to 39.9, and some left a recurring dot on the $\dot{8}$ of 39.$\dot{8}$ (so an infinite number of significant figures). Many students operated on the data provided seemingly at random, with addition, subtraction and multiplication seen as well as the division the wrong way round. It was common to leave the ' × 100' out of the expression, so that marking point 1 could not be awarded if the answer was incorrect.

03.3 Two thirds of students identified the volume of copper sulfate solution as the control variable.

03.4 Two thirds of students gave the correct answer. Some students gave the minimum or maximum temperature as their answer, rather than reading the mass at the turning point of the graph.

03.5 Most students realised that they needed to subtract the minimum temperature from the maximum, and three fifths of students scored at least one mark. Some, however, misread those values from the graph, with 45.4 – 20.4 being frequently seen. Although this gave the correct answer, it was as the result of incorrect working so did not score both marks. A minority of students were unable to start the calculation, and various multiplications of random values were seen.

03.6 Over a half of students gave a fully correct answer. Many students could not convert their volume to dm^3 even given the conversion factor, with many trying to do a calculation involving the mass of copper sulfate. However, partial credit was then awarded for those who substituted their value of volume into the given equation and calculated the results correctly. Many students do not seem to understand the terms volume and concentration, and that they mean different things.

03.7 Just over a half of students were able to draw two sharp straight lines, with a ruler, which passed through all the points. Some did not use a ruler, and a few drew an extra line joining the first and last points, meaning that full marks could not be awarded.

03.8 Students struggled with this standard demand question, with only a quarter gaining a mark. More than a half of students selected the second distractor, in which both parts of the statement are the opposite of the correct version. When temperature decreases, heat energy is being taken in from the surroundings and converted to chemical energy, so the reaction is endothermic. It is this reduction in heat energy that causes the temperature decrease. A misconception for many students is thinking that when heat energy is taken in from the surroundings it remains as heat energy in the system, causing the confusion with the direction of temperature change.

4.3.2.5 Concentration of solutions

Answer 09 · Examiner comments June 2024 | 8462/2F | Original Q5

Question 5 (low and standard demand)

05.1 One in two students were able to correctly explain why a 50 cm^3 flask is unsuitable for use in the method provided and obtain both marks. A further one in four achieved one mark for recognising that the flask was too small but did not provide a reason as to why this would be a problem.

05.2 More than 65% of students were able to correctly name a suitable piece of apparatus for measuring volume. The vast majority of students answered measuring cylinder with burette being a popular second choice. Care should be taken over the spelling of burette to avoid the incorrect response biuret.

05.3 Just over one third of students achieved both marks in this question and a further third achieved one mark. Students appeared to struggle to recognise and correctly identify both the independent and dependent variables. A sizeable number of students identified the independent and dependent variables the wrong way around achieving the compensation mark. It is important that students read the question carefully as there was a significant number of students who drew multiple lines from each box.

05.4 Over 4 in 5 students correctly identified that the time taken for the cross to disappear would increase.

05.5 Over 75% of students correctly identified the concentration of sodium thiosulfate that had the highest rate of reaction.

05.6 This question was well answered with over 90% of students being able to identify at least one correct statement to explain the effect of increasing the concentration. Almost 50% of students correctly identified both statements.

05.7 Just over 60% of students correctly identified what would happen to the time taken for the cross to disappear for both of the changes made to the investigation with a further 10% of students correctly identifying the effect of just one change. The most common incorrect response was to reverse the order.

Answer 10 · Examiner comments

June 2024 | 8462/2F | Original Q8

Question 8 (standard demand)

08.1 The test for sodium ions and the correct result were not well known with only 10% of students achieving both marks and a further 10% achieving one mark. Some students attempted to describe a flame test but failed to include the flame or how to introduce the sample into the flame in some way. Incorrect flame colours were often seen, particularly orange or crimson. Other incorrect tests that were commonly seen was the use of limewater or universal indicator.

08.2 The specific test for chloride ions is poorly understood with fewer than 1.5% of students achieving any marks. Many students misread the question and correctly described the test for chlorine gas. The mark for the result of the test was dependent upon a mark being awarded for a correct test.

08.3 The majority of students (more than 96%) were not awarded this mark. The use of words such as solution or liquid were common incorrect responses. The removal of **all** of the water was also not included by many students.

08.4 Less than 50% of students correctly identified how the mass of solid sodium chloride was calculated.

08.5 More than one in two students correctly calculated the mean concentration of sodium chloride and gained two marks. Fewer than one in five students correctly calculated the percentage. The remaining students either failed to progress in the calculation or attempted to calculate a percentage, frequently missing multiplying by one hundred, or getting the expression upside down. Many students incorrectly identified one of the concentrations as being anomalous despite this not being asked for in the q uestion. The only possible anomaly would be 36.4g/dm^3 and omitting only this value allowed students access to one of the two marks for the calculation of the mean concentration.

4.3.2.5 Concentration of solutions

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Question 8

08.1 Just over half of students gave the correct answer here. Many who did not gain the mark did not give the required comparative answer.

08.2 A third of students correctly identified the dependent variable. The most common incorrect response was the volume of seawater.

08.3 There was little understanding of heating to constant mass. It was clear that few students used the method to help support their answer and so most answered in terms of looking in some way to see if the water was still there – touch it/ use a paper towel/ stir it etc. The most common response was to heat for longer or heat over 100°C.

08.4 The clarity of expression of students meant that only 1 in 5 students gained this mark. Often mass was not mentioned, or the calculation was the wrong way round. Using the mass of the basin and 10cm^3 of water was also commonly seen. Students often did not go back to the method to aid them in answering this item.

08.5 Over half of students gained 4 of the 5 marks on this calculation. The most common error was not converting the volume at all or converting it incorrectly. Another error seen included taking anomalies out of the data given. If anomalies are present, students will be told to ignore anomalous results. Students also sometimes forgot to divide by 4 to get a mean. Marks could be awarded for other steps when one step was completed incorrectly.

08.6 Fewer than a quarter of students correctly suggested that samples were taken from different areas in the sea. Many re-worded the question.