

**Chemistry B**

General Certificate of Secondary Education **B642/01**

Unit 2: Modules C4, C5, C6

**Mark Scheme for June 2010**

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Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	sodium / Na <sup>+</sup> (1)	1	
		(ii)	chloride / Cl <sup>-</sup> (1)	1	
	(b)		barium chloride (1)	1	answer on answer line takes precedence but <b>allow</b> other ways of indicating answer e.g. ticking or ringing barium chloride
	(c)	(i)	it is alkaline (1)	1	answer on answer line takes precedence but <b>allow</b> other ways of indicating answer e.g. ticking or ringing alkaline
		(ii)	add universal (indicator) / pH paper (1)  compare colour obtained against a colour chart / AW (1)	2	indicator on its own is not sufficient <b>not</b> litmus / phenolphthalein / methyl orange <b>allow</b> full range indicator  <b>allow</b> colour chart mark even with wrong indicator <b>allow</b> its colour tells you the pH <b>but</b> to see what colour it goes is <b>not</b> sufficient <b>allow</b> examples of matching colour with pH e.g. if it is green then pH is 7 – the colour stated must match the pH i.e. red, yellow, orange for a pH below 7 and blue-green, blue or purple for pH above 7 colour linked to acid, alkali or neutral is <b>not</b> sufficient
<b>Total</b>				<b>6</b>	

Question		Expected Answers	Marks	Additional Guidance
2	(a)	any value between 20 to 40 (1) because label has 40°C (as maximum wash temperature) / enzymes will not be denatured (1)	2	unit not needed <b>allow</b> enzyme will not be destroyed / enzymes work best at this temperature / lowers 'carbon footprint' / helps to reduce global warming / AW <b>not</b> enzymes die
	(b)	(i)	1	<b>allow</b> makes clothes look whiter <b>ignore</b> all references to making colours brighter
		(ii)	1	<b>allow</b> kills microbes / bacteria <b>not</b> removes germs <b>allow</b> bleach stains
<b>Total</b>			<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance	
3	(a)	<p><b>any two from:</b>  crushed (1) with sand / in a mortar and pestle (1)</p> <p>dissolved in a solvent (1)</p> <p>distillation (1)</p> <p>chromatography (1)</p>	2	<p><b>allow</b> squeezed / ground up  <b>ignore</b> filtration</p> <p><b>allow</b> dissolved in water / dissolved in a named solvent / made into a solution</p> <p><b>allow</b> description of distillation</p> <p><b>allow</b> a description of chromatography</p>	
	(b)	(i)	made in small amounts / made on demand / when needed (1)	1	<p><b>allow</b> does not run 24/7  <b>allow</b> not a continuous process</p>
		(ii)	<p><b>any two from:</b>  testing of chemicals / research / trialling (1)  long time to complete development (1)  staff / wages / labour costs (1)  raw materials needed (1)  cost of equipment (1)</p> <p>safety (1)</p> <p>marketing / advertising (1)</p>	2	<p><b>ignore</b> all references to the environment</p> <p><b>allow</b> cost of chemicals  <b>ignore</b> transport</p>
		<b>Total</b>		<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
4	(a)	to make plants grow bigger / to make plants grow faster / to increase crop yield / replace essential elements (1)	1	<b>allow</b> to make more money <b>allow</b> replace nitrogen / replace potassium / replace phosphorus / replace nutrients <b>ignore</b> to make plants grow i.e. without any qualification <b>not</b> kills weeds / pests <b>ignore</b> plants grow healthier
	(b)	hydrogen and nitrogen (1)	1	<b>allow</b> N <sub>2</sub> and H <sub>2</sub> <b>allow</b> any order
	(c)	$\% \text{ yield} = \frac{\text{actual mass}}{\text{predicted mass}} \times 100 / \frac{37.5}{50} \times 100 (1)$  75 (1)	2	<b>allow</b> $\frac{\text{am}}{\text{pm}} \times 100$  <b>allow</b> full marks for correct answer with no working out
	(d)	2 (1)	1	answer on answer line takes precedence but <b>allow</b> other ways of indicating answer e.g. ticking or ringing 2
		<b>Total</b>	<b>5</b>	

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	3 (1)	1	<b>allow</b> three
		(ii)	$C_2H_2O_4$ (1)	1	<b>allow</b> any order of symbols <b>not</b> use of superscripts <b>not</b> use of h rather than H
	(b)	(i)	red / pink (1)	1	<b>not</b> orange / orange red / red orange
		(ii)	$H^+$ (1)	1	answer on answer line takes precedence but <b>allow</b> other ways of indicating answer e.g. ticking or ringing $H^+$
	(c)		(gas) syringe (1)	1	
	(d)	(i)	60 (1)	1	unit not needed
		(ii)	36 - 38 (1)	1	unit not needed
		(iii)	reactant runs out / no more acid / no more magnesium / AW (1)	1	<b>allow</b> all reactants / substances reacted <b>ignore</b> all the magnesium has dissolved
			<b>Total</b>	<b>8</b>	

Question		Expected Answers	Marks	Additional Guidance
6	(a)	0.32 (1)	1	unit not needed
	(b)	5.12	1	unit not needed <b>not</b> 5.1
	(c)	44 (1)	1	unit not needed
		<b>Total</b>	<b>3</b>	



Question			Expected Answers	Marks	Additional Guidance
7	(a)	(i)	H <sub>2</sub> O (1)	1	
		(ii)	Cu <sup>2+</sup> / H <sup>+</sup> (1)	1	
	(b)		goes up / AW (1) goes down / AW (1)	2	
			<b>Total</b>	<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance
8	(a)	<b>any three from:</b> nitric acid or potassium hydroxide in the burette (1) measure known volume of other chemical and put into beaker or flask (1) add indicator to flask (1) add chemical from burette until indicator changes colour (1) record volume of chemical in burette used (1)	3	<b>allow</b> use a pipette to measure volume / measure 25.0 cm <sup>3</sup> of chemical  but measure volume of chemical in burette that just makes the indicator change colour scores (2)
	(b)	add water (1)	1	
	(c)	sulfuric acid / hydrochloric acid / phosphoric acid	1	<b>allow</b> H <sub>2</sub> SO <sub>4</sub> / HCl / H <sub>3</sub> PO <sub>4</sub> <b>allow</b> other strong acids such as HBr / HI
		<b>Total</b>	<b>5</b>	

Question			Expected Answers	Marks	Additional Guidance
9	(a)	(i)	carbon, fluorine, chlorine (1)	1	<b>not</b> symbols <b>not</b> chloride / fluoride
		(ii)	5 (1)	1	
	(b)	(i)	aerosols (1)	1	
		(ii)	hydrocarbons / HCFC's / named hydrocarbon / nitrogen / HFC's (1)	1	
	(c)		<b>any two from:</b> sunburn(1) ageing of skin (1) <b>skin</b> cancer (1)  cataracts (1)	2	<b>ignore</b> sunstroke <b>ignore</b> damage to skin <b>ignore</b> premature ageing without reference to skin <b>allow</b> damage to eyes <b>ignore</b> blindness
			<b>Total</b>	<b>6</b>	

Question		Expected Answers	Marks	Additional Guidance
10	(a)	an ion- exchange column (1)	1	answer on answer line takes precedence but <b>allow</b> other ways of indicating answer e.g. ticking or ringing an ion - exchange column
	(b)	<p><b>any two from:</b></p> <p>use same volume of water each time (1)</p> <p>add soap solution to water and shake (1)</p> <p>continue to add soap until lather stays / add the same volume of soap (1)</p> <p><b>AND</b></p> <p>hardest water needs the most volume of soap / hardest water gives the least amount of lather / ora (1)</p>	3	<p><b>allow</b> a measured volume e.g. 25 cm<sup>3</sup> of both water samples</p> <p><b>allow</b> the same amount of water</p> <p><b>allow</b> add soap and stir</p> <p><b>allow</b> add the same amount of soap</p> <p>this marking point must link with the third marking point i.e. continue to add soap links with most volume of soap indicates hardest water</p> <p><b>or</b></p> <p>add the same amount of soap links with least amount of lather indicates hardest water</p> <p><b>ignore</b> amount of scum produced</p>
		<b>Total</b>	<b>4</b>	

Question			Expected Answers	Marks	Additional Guidance
11	(a)	(i)	ethene + water → ethanol (1)	1	<b>allow</b> $C_2H_4 + H_2O \rightarrow C_2H_5OH$ / $C_2H_4 + H_2O \rightarrow C_2H_6O$ <b>allow</b> mix of names and correct formulae <b>allow</b> steam for water <b>allow</b> = sign for arrow <b>not</b> and or & for + <b>not</b> + catalyst / + heat in the equation <b>but</b> allowed over the arrow
		(ii)	hydration (1)	1	answer on answer line takes precedence but <b>allow</b> other ways of indicating answer e.g. ticking or ringing hydration
		(iii)	(pass ethanol vapour over heated) catalyst (1)	1	<b>allow</b> (concentrated) sulfuric acid / (concentrated) phosphoric acid / high temperature / heat / any quoted temperature equal or above 150°C <b>ignore</b> the name of any named catalyst e.g. 'iron catalyst' would be awarded a mark <b>ignore</b> reference to pressure
	(b)		distillation (1)	1	
			<b>Total</b>	<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance
12	(a)	any two from: oil / grease (1) paint (1) galvanising / coat with zinc (1) sacrificial protection / use of named sacrificial metal (1) alloying (1)	2	allow layer of plastic (1)
	(b)	correct order (1) zinc iron tin	1	allow correct symbols Zn Fe Sn ignore zinc sulfate / iron sulfate / tin sulfate
		<b>Total</b>	<b>3</b>	

Question		Expected Answers	Marks	Additional Guidance
13	(a)	chlorine (1)	1	<b>allow</b> correct symbol C/
	(b)	(i)	1	<b>allow</b> makes water only <b>allow</b> does not produce greenhouse gases / CO <sub>2</sub> / no carbon emissions / low carbon footprint <b>ignore</b> does not give off any pollution
		(ii)	1	answer on answer line takes precedence but <b>allow</b> other ways of indicating answer e.g. ticking or ringing electrical
		<b>Total</b>	<b>3</b>	

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