

Chemistry B

General Certificate of Secondary Education

Unit **B642/01**: Modules C4, C5, C6 (Foundation Tier)

Mark Scheme for June 2011

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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

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The **Abbreviations, annotations and conventions** used in the detailed Mark Scheme are:

/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
allow	=	answers that can be accepted
()	=	words which are not essential to gain credit
—	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

Question			Expected Answers	Marks	Additional Guidance
1	a	i	optical brightener (1)	1	allow other ways of indicating correct response e.g. ringing or ticking the correct answer
		ii	remove stains / remove colour (1)	1	ignore kills bacteria ignore removes dirt
	b		optimal temperature is 35 °C / best temperature is 35 °C (1) more washing powder the faster the cleaning / washing power increases with amount of powder (1)	2	allow as temperature increases washing ability goes up and then goes down / ora / aw allow around 35 ⁰ C it takes less time for the stain to be removed
	c		saves energy / can wash delicate clothes / colour does not become paler (1)	1	allow reduces the carbon footprint / less greenhouse gases / less global warming / aw allow clothes will not lose colour / clothes will not shrink / clothes will not be damaged allow enzymes are not denatured ignore reference to cost ignore reference to environmentally friendly
			Total	5	

Question		Expected Answers	Marks	Additional Guidance
2	a	sodium / Na ⁺ (1)	1	allow other ways of indicating correct response e.g. ringing or ticking the correct answer
	b	silver nitrate (1)	1	allow other ways of indicating correct response e.g. ringing or ticking the correct answer
	c	white (1)	1	allow other ways of indicating correct response e.g. ringing or ticking the correct answer
	d	potassium chloride + barium sulfate (1)	1	allow KCl + BaSO ₄ allow mix of name and correct formula allow products in any order both required for the mark
	e	(prevents death) from water borne diseases / aw (1)	1	allow named disease such as cholera and dysentery allow can die from disease (in water) / reduce disease / dirty water contains harmful bacteria / dirty water contains pathogens allow clean water reduces disease ignore to survive / prevents illness / might die / to stay healthy
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
3	a	products are made on demand / periodically in a batch process but all the time in a continuous process / aw	1	to gain 1 mark both processes have to be referred to allow batch made in small / separate amounts and continuous in large amounts allow continuous works 24-7 but batch works for short periods of time
	b	any two from: starting materials / raw materials / reactants / barium peroxide / sulfuric acid / hydrogen / oxygen(1) catalyst (1) labour / salaries / workers (1) pollution control (1) rates / taxes (1) health and safety (1) maintenance of equipment / plant costs / equipment (1) quality control / testing (1)	2	allow materials on its own allow disposal of waste ignore environmental factors ignore cost of running plant or factory
	c	any two from: plant is crushed / plant is ground down (1) use of a solvent / use of named solvent (1) distillation (1) chromatography (1)	2	allow cut the plant / squeeze the plant allow dissolve in water / steam (with water) / boil with water
		Total	5	

Question			Expected Answers	Marks	Additional Guidance
4	a		1 (1)	1	
	b		through the roots (1)	1	allow dissolved in water / by osmosis ignore leaves
	c	i	ammonium sulfate (1)	1	allow other ways of indicating correct response e.g. ringing or ticking the correct answer
		ii	acidic (1)	1	allow contains hydrogen ions / weakly acidic ignore weak or strong
	d		60 (1)	1	
Total				5	

Question			Expected Answers	Marks	Additional Guidance
5	a	i	CH ₃ COOK (1)	1	allow other ways of indicating correct response e.g. ringing or ticking the correct answer
		ii	(aq) (1)	1	allow other ways of indicating correct response e.g. ringing or ticking the correct answer
	b		burette (1)	1	
	c	i	3.7 (1)	1	allow any value between 3.6 and 3.8
		ii	24 (cm ³) (1)	1	
	d		colourless in acid (1) pink in alkali (1)	2	allow one mark for colours reversed i.e. pink in acid and colourless in alkali
Total				7	

Question		Expected Answers	Marks	Additional Guidance
6	a	$C_2H_2O_4$ (1)	1	allow any order of atomic symbols not $C_2H_2O_4$ / $C^2H^2O^4$
	b	H^+ (1)	1	allow other ways of indicating correct response e.g. ringing or ticking the correct answer
	c	it is a stronger acid / contains more H^+ ions in solution / has a lower pH (with same concentration) (1)	1	assume answer refers to HCL unless specified allow it is not organic / contains chlorine / does not contain carbon / does not contain oxygen / not found in rhubarb leaves / found in stomach / reacts with silver nitrate / reacts with lead nitrate / reacts faster with Mg / reacts faster with oxides / reacts faster with carbonates / more acidic
	d	i	1	allow CO_2
		ii	1	allow strong(er) acid / it is strong(er) / it has too low a pH the kettle, metal or element is damaged is not sufficient ignore it is toxic / erode
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
7	a	i	1	
		ii	1	allow SO_4^{2-}
	b	negative electrode – potassium (1) positive electrode – chlorine (1)	2	allow one mark for potassium and chlorine but with the wrong electrodes not chloride
		Total	4	

Question	Expected Answers	Marks	Additional Guidance
8	<p>one mark from:</p> <p>a raw material sulfur / water / oxygen / air (1)</p> <p>any one mark from either</p> <p>a correct reaction</p> <p>sulfur burns in air to make sulfur dioxide / sulfur + oxygen → sulfur dioxide / sulfur dioxide reacts with oxygen to make sulfur trioxide / sulfur dioxide + oxygen → sulfur trioxide / sulfur trioxide reacts with water to make sulfuric acid / sulfur trioxide + water → sulfuric acid (1)</p> <p>or</p> <p>a correct condition</p> <p>450 °C / high temperature / 1 – 10 atmospheres pressure / atmospheric pressure (vanadium(V) oxide) catalyst</p>	2	<p>names of raw materials may be obtained from reaction equations.</p> <p>not any named incorrect raw material e.g. hydrogen</p>
	Total	2	

Question			Expected Answers	Marks	Additional Guidance
9			idea that mass of LHS – mass of K_2CO_3 is the mass of oxygen / 93 – 69 (1) 24 (g) (2)	2	award full marks for correct answer with no working out or incorrect working out mark the answer line first of all
Total				2	

Question			Expected Answers	Marks	Additional Guidance
10	a	i	19 ($^{\circ}C$) (1)	1	unit not required
		ii	zinc+ copper sulfate \rightarrow copper + zinc sulfate (1)	1	allow = instead of \rightarrow but not and / & allow correct formulae but ignore balancing / $Zn + CuSO_4 \rightarrow Cu + ZnSO_4$ allow mix of correct formulae and words
	b		order of reactivity magnesium, zinc, iron, tin (1)	1	
	c		any two from: paint (1) galvanising / plate with zinc (1) sacrificial protection / bolt on lump of magnesium (1) alloying (1) tin plate (1)	2	allow coating with plastic / enamelling / other metal
Total				5	

Question		Expected Answers	Marks	Additional Guidance
11	a	fats are solids and oils are liquids (1)	1	allow one is a solid one is a liquid
	b	i	1	
		ii	2	allow 2 marks for bromine water is decolourised ignore goes clear allow any shade of brown allow goes colourless not goes discoloured
	c	emulsion (1)	1	allow other ways of indicating correct response e.g. ringing or ticking the correct answer
Total			5	

Question		Expected Answers	Marks	Additional Guidance
12	a	gas A is hydrogen (1) (litmus paper) is bleached / loses colour / turns white (1)	2	allow H or H ₂ for hydrogen allow goes paler
	b	sterilise water / make solvents / make household bleach / make plastics (1)	1	allow making TCP / disinfectant / make medicines / produce (H)CFC's ignore swimming pools on its own / clean the water / clean swimming pools / medical uses
Total			3	

Question			Expected Answers	Marks	Additional Guidance
13	a	i	chlorine, fluorine and carbon (1)	1	ignore Cl, F and C allow any order
		ii	9 (1)	1	
		iii	ethanol is $\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array} \quad (1)$	1	allow displayed formula with no bond shown between O and H
	b		hydration	1	allow other ways of indicating correct response e.g. ringing or ticking the correct answer
			Total	4	

Question		Expected Answers	Marks	Additional Guidance
14	a	electrical (1)	1	allow other ways of indicating correct response e.g. ringing or ticking the correct answer
	b	<p>fuel cells only produce water (which is not a pollutant) /</p> <p>fuel cells do not produce greenhouse gases / carbon dioxide /</p> <p>burning petrol produces carbon dioxide which is a pollutant / greenhouse gas /</p> <p>fuel cells are more efficient / fuel cells will not use up oil supplies / fuel cells use renewable resources (1)</p>	1	<p>no mark for just repeating that burning petrol makes carbon dioxide or a fuel cell makes water. The statement must be qualified in some way as suggested in the expected answer.</p> <p>allow using fuel cells would prevent global warming (1) burning petrol causes global warming (1)</p> <p>ignore fuel cells do not create pollution on its own / petrol releases pollutants / fuel cells do not give off poisonous gases</p>
	c	<p>fuel cells are more efficient /</p> <p>fuel cells are lighter than batteries /</p> <p>fuel cells can be used continually / fuel cells do not need to be charged /</p> <p>fuel cells use the same fuel that propels the rocket /</p> <p>fuel cells produce water that can be used to drink (1)</p>	1	<p>allow ora if batteries are specified</p> <p>ignore more energy is produced</p> <p>allow fuel cells do not run out / fuel cells last longer / fuel cells do not need to be replaced</p> <p>not reference to pollution</p>
		Total	3	

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