OCR
RECOGNISING ACHIEVEMENT

GCSE

Chemistry B

General Certificate of Secondary Education

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

Mark Scheme for January 2012

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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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Annotations

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt **not** given
	error carried forward
	information omitted
	ignore
	reject
	contradiction

Subject-specific Marking Instructions

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

Question			Answer	Marks	Guidance
1	(a)		sulfuric acid / H_2SO_4 (1)	1	**allow** incorrect use of superscripts, subscripts or case
	(b)		ammonium nitrate / NH_4NO_3 (1)	1	**allow** ammonia / NH_3 **allow** incorrect use of superscripts, subscripts or case **ignore** sodium chloride
	(c)		sulfuric acid / H_2SO_4 (1)	1	**allow** incorrect use of superscripts, subscripts or case
	(d)		hydrochloric (acid) / HCl / sulfuric (acid) / H_2SO_4 (1)	1	**allow** incorrect use of superscripts, subscripts or case **allow** ammonium nitrate / NH_4NO_3
	(e)		sodium hydroxide **and** hydrochloric (acid) / NaOH **and** HCl (1)	1	**allow** mix of names and formulae **allow** incorrect use of superscripts, subscripts or case
			Total	**5**	

Question			Answer	Marks	Guidance
2	(a)		air / atmosphere (1)	1	**allow** from water
	(b)		**any three from:** energy / electricity / maintaining temperature catalyst (1) labour / salaries / workers (1) pollution control (1) rates / taxes (1) health and safety / maintenance of equipment (1) equipment (1) transport costs (1)	3	**ignore** cost of raw materials / starting materials **allow** maintaining pressure / flow of gas **allow** heat for energy **allow** fuel costs
			Total	**4**	

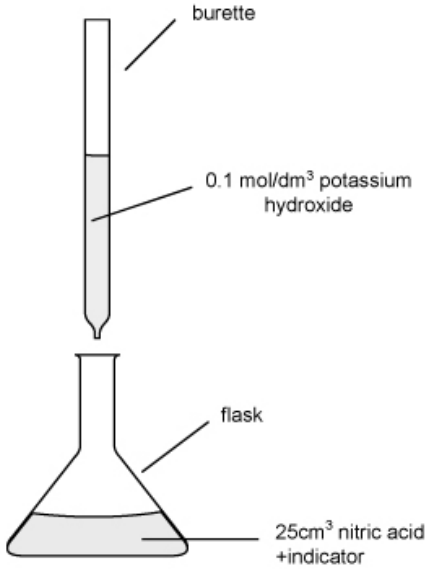
Question			Answer	Marks	Guidance
3	(a)		nitrogen **and** phosphorus (1)	1	**allow** N **and** P
	(b)		to make plants grow bigger / make plants grow faster / grow more / increase crop yield (1)	1	**allow** to replace essential element / to provide nitrogen for protein synthesis / to provide phosphorus to make DNA **allow** to make more money to make plants grow is **not sufficient**
	(c)		root (hair) (1)	1	
	(d)		149 (1)	1	
	(e)		$\frac{17.5}{25} \times 100$ (1) **but** 70 (2)	2	**allow** $\frac{am}{pm} \times 100$ for one mark if answer incorrect **allow** full marks for 70(%) with no working out
			Total	**6**	

Question			Answer	Marks	Guidance
4	(a)		1996 / 1997 (1)	1	
	(b)		increases / gets bigger (1)	1	
	(c)		decreases / becomes less alkaline / becomes more acidic (1)	1	**allow** becomes weaker alkali
	(d)		$CO_2 + H_2O \rightarrow H_2CO_3$ (1)	1	**allow** any correct multiple **allow** = instead of → **not** and or & instead of +
	(e)		sea water is alkaline / sea water will neutralise acids (1)	1	
			Total	**5**	

Question			Answer	Marks	Guidance
5	(a)		hydrogencarbonate / HCO_3^- (1)	1	**allow** incorrect use of superscripts, subscripts or case
	(b)		1.20 (g) (1)	1	unit **not** needed **allow** 1.2 (g)
	(c)		take water out of solution / boil / evaporate (1)	1	**allow** heat the solution **allow** add more ions to the water **allow** add salt / add chloride
	(d)		sulfate / SO_4^{2-} (1)	1	**allow** incorrect use of superscripts, subscripts or case
	(e)		white (1)	1	
	(f)	(i)	cathode (1)	1	
		(ii)	ions (1) can move / react at electrodes – dependant on marking point 1 being correct (1)	2	**allow** has charged particles (1) that can move (1) **allow** has free ions (2) **allow** has ions attracted to electrode (2) **allow** one mark for has particles that can move / electrons that can move
			Total	**8**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6</td><td>(a)</td><td></td><td>gas (1)</td><td>1</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>120 (tonnes) (1)</td><td>1</td><td>unit not needed</td></tr>
<tr><td></td><td>(c)</td><td></td><td><table><tr><th>sentence</th><th></th></tr><tr><td>At equilibrium the forward and backward reactions have stopped.</td><td></td></tr><tr><td>At equilibrium the rate of the forward reaction is greater than the backward reaction.</td><td></td></tr><tr><td>At equilibrium the rate of the forward reaction is the same as the backward reaction.</td><td>✓</td></tr><tr><td>At equilibrium the concentrations of the reactants are the same as the concentrations of the products.</td><td></td></tr><tr><td>At equilibrium the concentrations of the reactants and of the products do not change</td><td>✓</td></tr></table>one correct (1)
but
two correct (2)</td><td>2</td><td>if more than two ticks mark the incorrect answers first.
• one incorrect answer max 1 mark
• two or more incorrect will be 0</td></tr>
<tr><td></td><td>(d)</td><td></td><td>greater concentration of products / smaller concentration of reactants (1)</td><td>1</td><td>allow more products / more hydrogen / more carbon monoxide / less methane / less water / less reactants
ignore rate for forward faster than rate of backward reaction</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
</table>

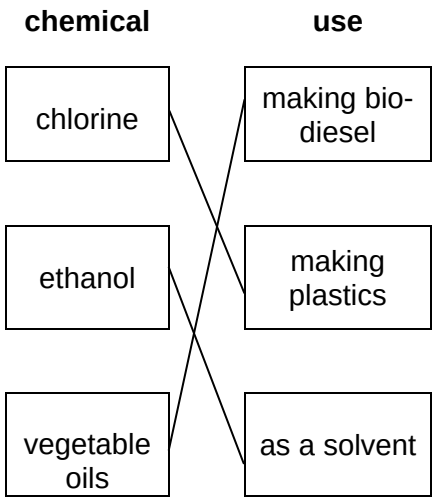
Question			Answer	Marks	Guidance
7	(a)	(i)	gas produced / carbon dioxide made (1)	1	**not** incorrect gas made **not** water or acid spits or spills out
		(ii)	0.05 (g) (1)	1	unit **not** needed
	(b)	(i)	11 (minutes)	1	unit **not** needed **allow** any time between 10 to 11 minutes **not** 10 minutes
		(ii)	acid runs out / reactants run out (1)	1	**allow** calcium carbonate runs out **allow** the limiting reactant has fully reacted **allow** all the powder has reacted
			Total	**4**	

Question			Answer	Marks	Guidance
8			acid (measured) in pipette and alkali (measured) in burette (1) alkali added to the acid in the flask (1) stop when indicator changes colour (1)	3	marks can be awarded either from a labelled diagram or a written description e.g. 
			Total	**3**	

Question			Answer	Marks	Guidance
9	(a)		carbon, chlorine, fluorine (1)	1	all **three** required order unimportant **not** C, Cl, F
	(b)		**any two from** idea of depletion of ozone layer (1) allows more UV to reach Earth's surface (1) increases the risk of skin cancer, cataracts or crop damage (1) CFCs make chlorine atoms / CFCs make (free) radicals (1) CFCs only slowly removed from atmosphere (1) they are greenhouse gases (1) global warming (1)	2	 **allow** makes holes in the ozone layer **allow** lets more UV through **allow** slow to degrade / inert
			Total	**3**	

Question			Answer	Marks	Guidance
10	(a)	(i)	5.2 (1)	1	
		(ii)	tap water (1)	1	
		(iii)	idea of a control (1)	1	e.g. so can compare other samples to it **allow** to give a baseline **ignore** distilled water contains very little hardness
	(b)		add washing soda / sodium carbonate (1) ion exchange (resin) (1)	2	
			Total	**5**	

Question			Answer	Marks	Guidance
11	(a)	(i)	25 (cm^3) (1)	1	**allow** 24.5 to 25.5 (cm^3)
		(ii)	answer in the range 42 to 44^oC (1)	1	
	(b)		yeast contains an enzyme (1)	1	**allow** speeds up reaction / acts as a catalyst
	(c)		hydration (1)	1	**allow** correct answer ticked, underlined or circled if answer line is blank
			Total	**4**	

Question			Answer	Marks	Guidance
12			 **all** correct (2) but **one** or **two** correct (1)	2	
			Total	**2**	

Question			Answer	Marks	Guidance
13	(a)	(i)	painkiller /AW (1)	1	
		(ii)	ibuprofen (1)	1	**allow** morphine / co-codamol / codeine / nurofen
	(b)		$C_9H_8O_4$ (1)	1	**allow** any order **not** $C^9H^8O^4$
			Total	**3**	

Question			Answer	Marks	Guidance
14	(a)		idea of barrier / stop water, oxygen or air reaching iron (1)	1	protects the iron is **not** sufficient
	(b)		**any two from** galvanising / coating with zinc (1) sacrificial protection / correctly named metal (1) alloying (1) tin plating (1) painting (1)	2	**allow** coating with plastic/enamelling
			Total	**3**	

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