OCR
Oxford Cambridge and RSA

GCSE

Further Additional Science B

Unit **B762/01:** Modules B6, C6, P6 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2014

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

For answers marked by levels of response:

a. **To determine the level** – start at the highest level and work down until you reach the level that matches the answer

b. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

Annotation	Meaning
BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.

Annotations used in scoris

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

Question	Answer	Marks	Guidance
1 a i	B C (A) D (2) B before C = (1) C before D = (1)	2	
ii	DNA fingerprinting ☐ fermenting ☐ genetic engineering ☑ pasteurising ☐ (1)	1	more than one tick scores zero
b	Lilly (1)	1	
	Total	**4**	

Question	Answer	Marks	Guidance
2 a	chickenpox ☐ cholera ☑ food poisoning ☑ influenza ☐ (1)	1	more than two ticks = 0
b	(bacteria) not killed by the antibiotic (1)	1	**allow** antibiotics do not work /cannot treat using antibiotics **allow** bacteria not affected by the antibiotic **ignore** they have mutated **ignore** just 'they cannot be killed'
c	the more doses given then the greater (percentage of bacteria show) resistance (1)	1	**ignore** positive correlation unless answer states the variables **ignore** higher the number of resistant bacteria the more does needed
	Total	**3**	

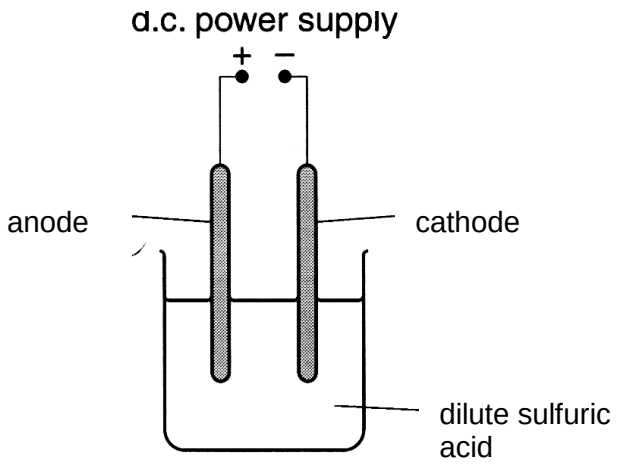
Question	Answer	Marks	Guidance
3	**any three from** gases made by decay / rotting / decomposition (1) action of microorganisms / bacteria / fungi (1) gases likely to contain methane (1) gases could be explosive (1)	3	**allow** gases made when dead plants and animal waste is broken down (1) **ignore** fermenting **allow** gas is methane (1) **allow** gases are flammable (1) **allow** gases could be toxic / poisonous (1) **ignore** gas is dangerous **ignore** harmful
	Total	**3**	

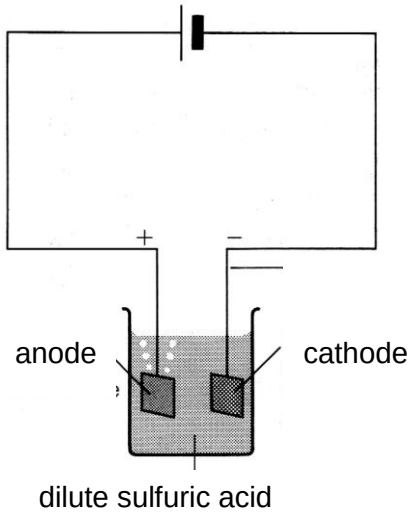
Question	Answer	Marks	Guidance
4 a	**any two from** used by yeast (1) in anaerobic conditions (1) for food / for respiration / for fermentation (1) (yeast) turn sugar into alcohol / ethanol (1)	2	
b	juice has sugar content of 290 (g per litre) (1) (maximum) alcohol content of wine is 14.9(%) (1)	2	
c	(actual alcohol content =) 11.79 (%) (1) (Tim is correct), as actual alcohol content is lower than maximum possible / maximum possible = 14.9 (%) (1)	2	**ignore** he is correct as not all the sugar has been changed to alcohol **allow** 11.8 (%) yes, as 11.79 is less than 14.9 = (2) **only** made 11.79 not 14.9 = (2)
d	(treated to) increase alcohol content (1) by distillation (1)	2	**allow** (treated to) increase alcohol concentration (1) **ignore** just 'heat the wine'
	Total	**8**	

Question	Answer	Marks	Guidance
5 a	The other sugars do not dissolve in water. ☐ The other sugars taste sweeter. ✓ The other sugars are different colours. ☐ The other sugars contain gel. ☐ (1)	1	more than one tick scores zero

Question	Answer	Marks	Guidance
b	**[Level 3]** Answer includes complete description of how enzymes are immobilised **and** makes any comment about an advantage **and** a disadvantage. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Answer includes incomplete description of how enzymes are immobilised **and** makes any comment about an advantage **or** disadvantage. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Answer includes incomplete description of how enzymes are immobilised **or** makes any comment about an advantage **or** makes any comment about a disadvantage. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** method for immobilising- • use of gel beads • mixing the enzyme with alginate • dropping the mixture into calcium chloride solution choice may consider- **disadvantages** • immobilised enzyme has a higher optimum temperature • more energy / **higher temperature** needed to get the faster rate of breakdown **advantages** • mixture not contaminated with enzyme when it is immobilised /easy to separate from product • with immobilised enzyme it can be a continuous flow process • do not waste production time between batches • enzymes can be reused **ignore** idea of working at higher temperature is an advantage **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**7**	

Question	Answer	Marks	Guidance
6 a	contains oxygen (1)	1	**allow** has O in the formula **allow** contains more than carbon and hydrogen / formula has more than just C and H **allow** hydrocarbons **only** have carbon and hydrogen
b i	**solvent** (1) replacing petrol (1)	2	**ignore** named products that may have ethanol as a solvent **allow** fuel / heating homes(1) **not** lighter fuel **allow** antiseptic / for sterilising / hand sanitizer / medical wipes(1) **ignore** detergents **ignore** just 'cleaning'
	Total	**3**	

Question	Answer	Marks	Guidance
7 a	suitable container containing dilute sulfuric acid (1) two electrodes dipped in electrolyte with indication of a circuit e.g. + and – **or** a dc power supply (1) anode and cathode correctly labelled with + and – **or** correctly matching cell with anode attached to larger of the two lines (1)	3	**not** single wire attached to 2 electrodes e.g. 

			 + − anode cathode dilute sulfuric acid

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>7 b</td><td>
<table>
<tr><th rowspan="2">Molten electrolyte</th><th colspan="2">Substance made at</th></tr>
<tr><th>Cathode</th><th>Anode</th></tr>
<tr><td>lead bromide</td><td>lead</td><td>bromine</td></tr>
<tr><td>sodium chloride</td><td>sodium</td><td>chlorine</td></tr>
<tr><td>calcium iodide</td><td>calcium</td><td>iodine</td></tr>
</table>
</td><td>2</td><td>one mark for each correct row

allow one mark for any two correct answers

allow one mark if sodium and calcium at anode and chlorine and iodine at cathode

not iodide or chloride</td></tr>
<tr><td>c</td><td>solid – idea that ions in fixed positions (and cannot move) (1)

molten – idea that ions free (to move) (1)</td><td>2</td><td>ignore reference to electrons /atoms

ignore reference to electrons

in one ions are free (to move) but in the other they are not / ions need to move for electrolysis to occur = 1 mark</td></tr>
<tr><td></td><td>Total</td><td>7</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
8 a	C (1)	1	**allow** correct answer circled, underlined or ticked if answer line is blank
b	3 (1)	1	
c	$C_2H_2F_4$ (1)	1	order of symbols unimportant
d	**any two from:** chemically inert (1) low boiling point (1) insoluble in water (1)	2	**allow** non-flammable (1) **allow** volatile (1)
	Total	**5**	

Question	Answer	Marks	Guidance
9	**[Level 3]** **All metals in correct order of reactivity with a full and correct explanation that includes ideas about all the metals.** **AND** **the correct word equation.** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** **All metals in correct order of reactivity with an attempt at an explanation that includes ideas about some of the metals.** **AND the correct word equation.** **OR** **All metals in correct order of reactivity with a full and correct explanation that includes ideas about all the metals.** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** **Any three metals in correct order of reactivity (no explanation required)** **OR** **the correct word equation.** Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0marks)	6	**This question is targeted at grades up to C .** **Indicative scientific points may include:** **order of reactivity** • magnesium > zinc > iron > copper **explanation** • magnesium most reactive as it will displace other three metals (from solutions of their salts) / react with all the solutions • zinc more reactive than iron and copper as it will displace iron and copper (from solutions of their salts) / react with iron (II)sulfate and copper sulfate • zinc less reactive than magnesium as it cannot displace magnesium (from solutions of their salts) / does not react with magnesium sulfate. • iron more reactive than copper as it will displace copper (from solutions of their salts) /react with copper sulfate • iron less reactive than magnesium and zinc as it cannot displace magnesium or zinc (from solutions of their salts) /does not react with magnesium sulfate or zinc sulfate • copper is least reactive as it cannot displace magnesium, zinc or iron (from solutions of their salts) / does not react with any of the solutions **word equation** • magnesium + copper sulfate → magnesium sulfate + copper **allow** correct formulae or a mix of formulae and names e.g. $Mg + CuSO_4 \rightarrow MgSO_4 + Cu$ **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
		6	

Question	Answer	Marks	Guidance
10	**any two from:** making soap (1) making biodiesel (1) making margarine (1)	2	 **allow** fuel / biofuel (1) **allow** (fuel) used for heating(1) **allow** cooking /make mayonnaise (1) **allow** lubricant (1) **allow** used to prevent rusting of machinery (1)
	Total	**2**	

Question	Answer	Marks	Guidance
11	$2H_2 + O_2 \rightarrow 2H_2O$ correct formula (1) balancing – dependent on correct formula (1)	2	**allow** any correct multiple **allow** = or ⇆ for arrow **not** 'and' or & for + **allow** one mark for correct balanced equation with minor errors in case, subscript and superscript e.g. $2H^2 + O_2 \rightarrow 2h_2O$ (1)
	Total	**2**	

Question	Answer	Marks	Guidance
12 a i	 (1)	1	**allow** two vertical lines of equal length by eye (1) **allow**  (1) **not** the symbol for a cell
ii	stores (1) (electric) charge (1)	2	**ignore** carries / electricity / conducts e.g. carries charges (1) e.g. stores electricity (1) **allow** to produce a smooth(er) output (1) but smoothing AC scores (2)
b	diagram shows wave rectification (1) **but** diagram show full wave rectification (2)	2	**max 2 marks** **allow** changes (AC) to DC / AW (1)
	Total	**5**	

Question	Answer	Marks	Guidance
13	**[Level 3]** **Identifies both conductors AND describes current and voltage for both conductors AND compares the resistances** Quality of written communication does not impede communication of the science at this level (5 – 6 marks) **[Level 2]** **Describes how current and voltage vary for both conductors OR makes a correct comment about resistance** **AND identifies one of the conductors or calculated resistance** Quality of written communication partly impedes communication of the science at this level (3 – 4 marks) **[Level 1]** **Describes how current and voltage vary for one conductor OR identifies one of the conductors OR makes a correct comment about resistance** Quality of written communication impedes communication of the science at this level (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C.** **If no conductors correctly identified maximum level 2** **Indicative scientific points may include:** **Comparison of resistance** • for conductor **A** the resistance is constant but for conductor **B** the resistance changes • for **B** resistance increases with increases in voltage and current (temperature) • **allow** correct use of R=V/I (e.g. R for A = 4.3Ω and resistance of B = 12.6 Ω (for a current of 0.7A) • **ignore** resistance in B is higher unless qualified **Comparison of voltage and current** • for conductor **A** and **B** the current increases as the voltage increases • for conductor **A** the graph is a straight line but for conductor **B** the graph is a curve • for conductor **A** the relationship is linear but for conductor **B** the relationship is not linear • any correct comparison e.g. when current is 0.7 A the voltage is lower / 3 V in conductor **A** but higher / 8.7 V in conductor **B** **Identification of the conductors** • conductor **A** is an Ohmic conductor / metal • conductor **B** is a non-Ohmic conductor / bulb / named appliance or wire that gets hot **Use the L1, L2, L3 annotations in scoris.** **Do not use ticks.**
	Total	**6**	

Question	Answer	Marks	Guidance
14 a	**NOT** (gate) (1)	1	
b i	**B** and **C** (1)	1	more than one scores 0 marks if answer line blank allow correct answer indicated in list
ii	**D** and **E** and **F** (1)	1	any order and all 3 required any incorrect letter in answer scores 0
iii	**111** (1) **111** (1)	2	
c i	current from a logic gate is (too) small / not enough current (1)	1	**allow** idea that voltage is too low (1) **ignore** getting **no** current **ignore** voltage / current too weak **ignore** because bulb is broken
ii	relay (1)	1	more than one answer scores (0) if answer line blank allow correct answer indicated in list
	Total	**7**	

Question	Answer	Marks	Guidance
15 a	(R2) (R_T) **3.0** **and 7.2** (1) R1 + R2 = R_T (1)	2	**both required for 1st marking point**
b	variable resistor (1) if R4 increases, output voltage increases /ora (1)	2	**allow** rheostat (1) **allow** output voltage depends on ratio of R3:R4 / AW (1)
c	as the light level increases the resistance decreases /ora (1) the relationship is not linear (1) at high light levels the changes in resistance are small (1)	3	**not** as resistance decreases more light is given off
	Total	**7**	

Question	Answer	Marks	Guidance
16 a i	7.0 (1)	1	**allow** 7
ii	**any two from:** pH of the milk drops(1) reference to lag period before pH drops (1) constant pH after drop / levels off (1) suitable quoting of data (1)	2	 **allow** becomes (more) acidic (1) **ignore** just 'pH changes' **but** allow pH changes to a lower pH / stated number below pH7.0 e.g. drops to pH4 (1) **allow** stays neutral or level at start / for a while (1) **ignore** 'levels of at pH4' e.g. levels off at **pH 3.8** (2)
iii	bacteria A (1) idea that it reduces the pH quicker (so make yogurt quicker) (1)	2	 **allow** finishes first / levels off first / takes less time (1)
b	the larger the animal the higher the limit / AW (1) cows used for milk have a lower limit / cows used for milk do not fit the trend **because** the poison gets into milk very quickly / does not have time to break down in the milk (1)	2	ORA

Question	Answer	Marks	Guidance
c i	0.52 (1)	1	
ii	**any two from:** treating the milk does lower the aflatoxin concentration (1) average for bacteria A is below the legal limit for human food (1) so humans could eat the yogurt (but would not be able to drink the milk) (1)	2	**allow** removes the aflatoxin from the milk(1) **ignore** makes milk safer to drink **allow** know which bacteria to use to treat milk / know to use bacteria A to treat milk (1)
		10	

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