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GCSE Separate Science (Chemistry)

SAMPLE MARK SCHEME

First Examination Summer 2008

USING THE MARK SCHEME

1. This mark scheme gives you;
   * an idea of the type of response expected
   * how individual marks are to be awarded
   * the total mark for each question
   * examples of responses that should not receive credit.

2. ; separates points for the award of each mark.

3. / means that the responses are **alternatives** and either answer should receive full credit.

4. ( ) means that a phrase/word is not essential for the award of the mark but helps the examiner to get the sense of the expected answer.

5. Phrases/words in **bold** indicate that the meaning of the phrase/word is **essential** to the answer.

6. **OWTTE** (or words to that effect) and eq (equivalent) indicate that valid alternative answers (which have not been specified) are acceptable.

7. '**Ignore**' means that this answer is not worth a mark but does not negate an additional correct response.

8. '**Reject**' means that the answer is wrong and negates any additional correct response for that specific mark.

9. **ORA** (or reverse argument) indicates that the complete reverse is also valid for the award of marks.

10. ecf (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

MARKING

1. You must give a tick (in red) for every mark awarded. The tick must be placed on the script close to the answer.

   The total mark awarded for a question should be written in the box at the end of the question.

2. The total marks for a question should then transferred to the front of the script.

3. Suggestion/explanation questions should be marked correct even when the suggestion is contained within the explanation.

4. **Do not** award marks for repetition of the stem of the question.

5. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct scientific context.

AMPLIFICATION

1. In calculations, full credit must be given for a bald, correct answer. If a numerical answer is incorrect, look at the working and award marks according to the mark scheme.

2. Consequential marking should be used in calculations. This is where a candidate's working is correct but is based upon a previous error. When consequential marks have been awarded write "ecf" next to the ticks.

3. If candidates use the mole in calculations they must be awarded full marks for a correct answer even though the term may not be on the syllabus at their level.

4. If candidates use chemical formulae instead of chemical names, credit can only be given if the formulae are correct.

Mark Scheme – GCSE Separate Science Chemistry

1.

(a) sulphur + oxygen → sulphur dioxide; (1)

(b) (i) $2SO_2 + O_2 \rightleftharpoons 2SO_3$;;
or
correct symbols and formulae; (1)
balanced equation; (1)

(ii) increases reaction rate / lowers activation energy; (1)

(c) (i) lowers yield / less product / more sulphur dioxide / less sulphur trioxide; (1)
endothermic reaction favoured; (1)
equilibrium favours left hand side;

(ii) increases rate of attainment of equilibrium / rate of reaction; (1)
particles have more energy; (1)
more collisions occur / (average) energy of collisions greater; (1)

(d) $\underline{CH_3OH} + CH_3COOH \rightarrow CH_3COOCH_3 + \underline{H_2O}$

methanol + <u>ethanoic acid</u> → methyl ethanoate + <u>water</u>

formula CH_3OH; (1)

ethanoic acid; (1)

H_2O **and** water; (1)

Total 13 marks

2.

(a) (i) qualitative; (1)

(ii) K^+ - lilac / purple; (1)

Ca^{2+} - red-orange / brick-red / dull-red; (reject : orange) (1)

Cu^{2+} - green / blue-green; (1)

(iii) flame test – flame colour;
indicates specific metal ion / potassium ions; (2)

hydrochloric acid and barium chloride test – tests for sulphate ions; (1)

(iv) flame test – use of (concentrated) hydrochloric acid to clean flame test wire; (1)
dip flame test wire into acid then into solid; (1)

place into Bunsen flame; (1)

other similar methods of carrying out the flame test should also be given credit

hydrochloric acid and barium chloride test -

acidify with hydrochloric acid and add (drops of) barium chloride solution; (2)
(hydrochloric acid) removes carbonate / sulphite ions;

(v) white precipitate (of barium sulphate) (1)

(vi) the concentration of metal ions in the river water may not be high enough to be detected using flame test;
other metal ions might cover up flame colour for potassium; (2)

Total 15 marks

3.

(a) (i) all good conductors of electricity / or suitable similar physical property; (1)

(ii) hydrogen; (1)

2Li + **2**H_2O → **2**LiOH + H_2;; (2)
or
correct symbols of products; balanced;

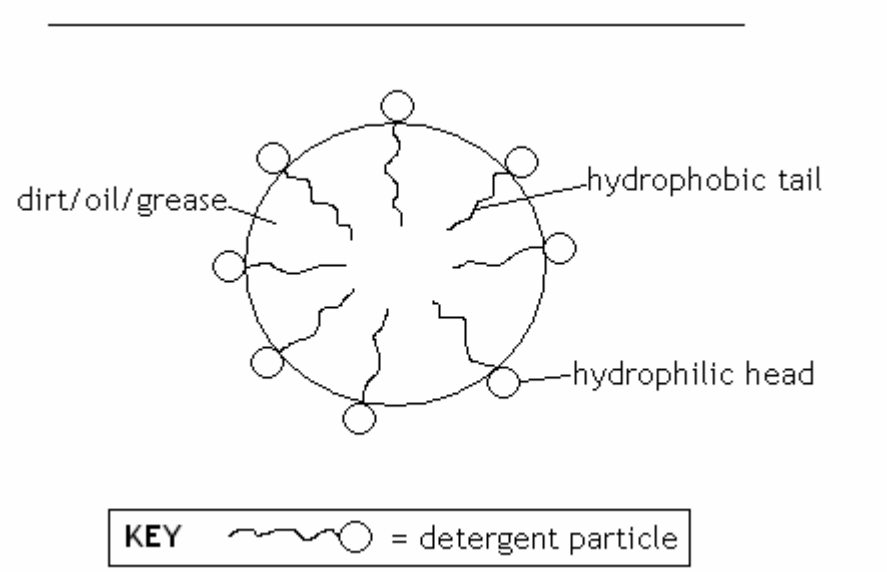
(a) ester/ triglyceride / carboxylic acid / fatty acid ; (1)

(b) eg for an ester - ethyl ethanoate; (1)

$CH_3COOCH_2CH_3$ (1)
(or other suitable named compound; and formula; that fit with the series of compounds from the previous item)

(c) no scum / soap not wasted / less detergent is needed (1)

(d)



a detergent molecule;
(hydrophobic) end in oil / grease;
detergent molecules surrounding oil / grease; (3)

Total 11 marks

4.

(a) 2nd titration 12.20; (1)

3rd titration 12.20; (1)

(b) to obtain two consistent / concordant / reliable results; (2)
(reject : accurate)
anomalies can be seen and not used;

(c) (volumetric) pipette; (reject : measuring cylinder)
conical flask / or suitable piece of apparatus; (2)

(d) no. moles sodium hydroxide = $\frac{\text{vol} \times \text{concentration}}{1000} = \frac{12.20 \times 0.2}{1000}$;
= 0.00244)
no. moles sulphuric acid = ½ x no. moles sodium hydroxide ;
= ½ x 0.00244
concentration of sulphuric acid = $\frac{\text{no. moles } H_2SO_4 \times 1000}{\text{volume}}$;
= $\frac{½ \times 0.00244 \times 1000}{20.00}$
= 0.061 (mol dm^{-3});

Units not required for full marks
Alternative methods of calculation should be marked accordingly
Allow for transfer errors
Credit should be given for method of calculation
A 'bald' answer of 0.061 with no working should be given full marks

Total 10 marks

5.

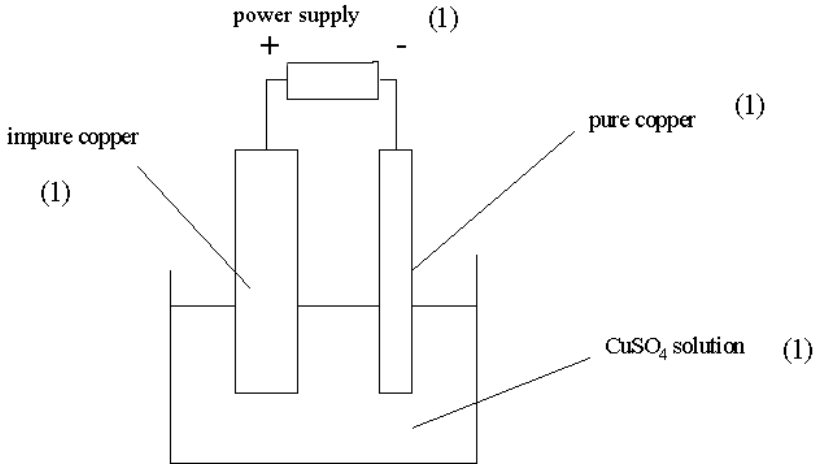
(a) relative formula mass copper oxide = (64 +16) = 80; (1)
relative formula mass (sulphuric acid = (2 + 32 + (16 x 4)) = 98; (1)

either:
80 g of copper oxide reacts with 98 g of sulphuric acid;
$\frac{80 \times 9.8}{98}$; g copper oxide reacts with 9.8 g of sulphuric acid
= 8.0 g copper oxide;

or:
no. moles sulphuric acid = 9.8 / 98 = 0.1 mole;
from reaction equation
no. moles sulphuric acid = no. moles copper oxide;
mass of copper oxide = no. moles copper oxide x relative formula mass copper oxide (3)
= 0.1 x 80 = 8.0 g;

Accept final answer to 1 sig fig (8 g)
Allow for transfer errors from formula masses

(b) (i) (4)



impure copper has to be connected to + terminal of power supply
pure copper has to be connected to – terminal
candidates are not expected to know the symbol for a power supply

(ii) 2e (1)

(iii) (copper ions) **gain electrons and this is reduction**; (1)
reject : loses oxygen or similar

Total 11 marks

TOTAL FOR PAPER = 60 MARKS