

Mark Scheme (Results) Summer 2007

GCSE

GCSE Science (1530/4H)

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 mark awarded for part of a question should be written in the margin close to the sub-total.
2. The sub-total marks for a question should be added together and the total written and ringed at the end of the question 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 bold, 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.

QUALITY OF WRITTEN COMMUNICATION

Students will be assessed on their ability to:

present relevant information in a form that suits its purpose

ensure that spelling, punctuation and grammar are accurate, so that the meaning is clear

use a suitable structure and style of writing.



- 1 a Any two from:
 1. volume water;
 2. volume soap;
 3. amount of shaking (time or strength);
 4. concentration of soap;
 5. same temperature; 2
- b B and C hard / contain Ca^{2+} or Mg^{2+} ions; [Ignore type of soap]
 A soft / does not contain Ca^{2+} or Mg^{2+} ions / not hard; 2
- plus one communication mark for using a suitable structure and style
 of writing; 1
- c B **temporary** hardness / HCO_3^- (ions);
 C **permanent** hardness; 2
- d removes calcium/magnesium ions / correct formulae/
 ions causing hardness; 2
 [Ignore removes hardness]
 makes soft;

Total 9 marks

- 2 a Any two from:
 1. cutlery will not rust/corrode/strong/unreactive to food/
 non toxic;
 2. saucepans will not rust/corrode/ strong/ conducts heat/
 unreactive to food/non toxic/high melting point; 2
3. surgical instruments will not rust/corrode/non-toxic/inert;
 [Reject easy to clean/strong]
 4. chemical reactors will not react with chemical substances/
 strong/OWTTE;
- b An explanation to include:
 protective layer;
 of (aluminium) oxide; 2
- plus one communication mark for ensuring that spelling, punctuation
 and grammar are accurate, so that the meaning is clear; 1
- c mixture/compound of metals/metal and carbon; 1
- d scientific paper/ conference/books;
 [Reject computers/newspapers] 1
- e does not corrode/rust; 1
- f cheaper/more malleable etc; 1

Total 9 marks

- 3 a red litmus turns blue (in solution); 1
- b -blue ppt/ solid; [Reject solution] 4
 -nothing/colourless liquid;
 -green ppt/ solid;
 -nothing/colourless liquid;
- c all contain water/shows presence of water; 2
 all go pink/all give same result/OWTTE;
- d (i) (dilute) hydrochloric acid/ (dilute) nitric acid; 3
 barium chloride (solution)/ barium nitrate (solution);
 white precipitate;
- (ii) copper sulphate; 2
 sulphuric acid;

Total 12 marks

- 4 a step 1 - use pipette or burette; 1
- step 5 - add dropwise towards end/ add until colour just changes; 1
- b pink/magenta to colourless; 1
- c (i) 20.00 (cm³); [R 20, 20.0] 1
- (ii) amount HCl = 0.025 mol;
 amount NaOH = 0.025 mol (or 1:1 ratio); [Allow transfer error]
 concentration = 0.025 x 1000/20 = 1.25 (mol dm⁻³);
 [19.95 cm³ → 1.25 mol dm⁻³
 20.05 cm³ → 1.25 mol dm⁻³
 20.20 cm³ → 1.24 mol dm⁻³
 20.60 cm³ → 1.21 mol dm⁻³]

3

$$\text{OR } \frac{\text{no. moles hydrochloric acid reacting}}{\text{no. moles sodium hydroxide reacting}} = \frac{20.00x}{25.00 \times 1.00} = \frac{1}{1}$$

$$x = \frac{25.00 \times 1.00}{20.00}$$

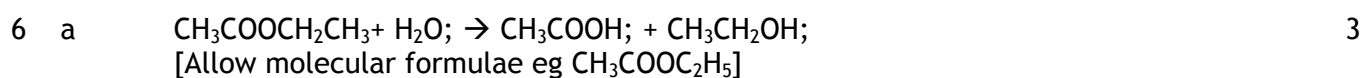
concentration = 1.25 (mol dm⁻³)

Total 7 marks

- 5 a 1. lower temp → higher yield; 3
 2. because forward reaction exothermic;
 3. but slower to reach equilibrium/lower rate;
- b An explanation to include any two from: 2
 1. high pressure → higher yield;
 2. but not worth expense/ high pressure → safety risks;
 3. enough pressure used to push gases through plant;
- c none; 1

- d (i) $M_r(\text{SO}_2) = 64$;
amount = $1000/64 = 15.625 \text{ (mol}^3\text{)}$;
volume = answer x 24 = $375 \text{ (dm}^3\text{)}$
OR
 $64\text{g} = 24 \text{ dm}^3$
 $1000\text{g} = \frac{24 \times 1000}{64} \text{ dm}^3$
= 375 dm^3 ; 3
- (ii) =answer to (i) [$375 \text{ (dm}^3\text{)}$]; 1
- (iii) =answer to (i)/2; x 5; [= $937.5 \text{ (dm}^3\text{)}$] 2

Total 12 marks



- b (i) methanoic acid
ethanoic acid
propanoic acid
butanoic acid

4 correct in correct order;; 2
3/4 correct in wrong order;

- (ii) Any two from:
series of compounds with same functional group/
same general formula/same chemical properties/ 2
some method of preparation;
and gradually changing physical properties;
differ by CH_2 each time;

- (iii) magnesium ethanoate; hydrogen; 2

- (iv) $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$; [allow $\text{H}_3\text{O}^+ + \text{OH}^- \rightarrow 2 \text{H}_2\text{O}$];
Or
 $\text{CH}_3\text{COOH} + \text{OH}^- \rightarrow \text{H}_2\text{O} + \text{CH}_3\text{COO}^-$;
($\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{H}_2\text{O} + \text{CH}_3\text{COONa}$ MAX 1) 2

Total 11 marks

TOTAL MARKS 60