UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2006 question paper

0653 and 0654 COMBINED SCIENCE

0653/06 and 0654/06 Paper 6, maximum raw mark 60

These mark schemes are published as an aid to teachers and students, to indicate the requirements of the examination. They show the basis on which Examiners were initially instructed to award marks. They do not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

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 must be read in conjunction with the question papers and the *Report on the Examination*.

The minimum marks in these components needed for various grades were previously published with these mark schemes, but are now instead included in the Report on the Examination for this session.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the May/June 2006 question papers for most IGCSE and GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of CAMBRIDGE
International Examinations

1

tube no	contents	observations
1	(protein, pepsin, water)	cloudy/no change
2	protein, pepsin, hydrochloric acid	clear
3	protein, water	cloudy/no change
4	starch, amylase, water	(light)brown
5	starch, amylase, hydrochloric acid	blue/black
6	starch, water	blue/black

(a) (i) tube contents entered in table correctly (do not penalise the omission of water) **[1]**

(ii) observations recorded clearly: cloudy in tubes 1 and 3 (1)
clear in tube 2 (1)

(ignore any other comments) **[2]**

(iii) observations recorded clearly: brown iodine in tube 4 (1)
blue/black in tubes 5 and 6 (1)

(ignore any other comments) **[2]**

(b) (i) pepsin **[1]**

(ii) enzyme prevented from working by the acid/has an optimum pH/is denatured by the acid/works better in neutral solution **[1]**

(iii) to act as a control/check that no breakdown occurs unless enzyme is present

reject: to act as a comparison (if no further information) **[1]**

(c) add biuret reagent (or copper sulphate + alkali)
turns lilac/purple/mauve **[2]**

[Total: 10 marks]

2 (a) (i) 21 mm (+/- 1 mm), 2.1 cm^3 (both needed for the mark)
volume correctly calculated 9.3 cm^3 (e.c.f) (second d.p.not needed) **[2]**

(ii) 25.1 g (+/- 0.05 cm^3) **[1]**

(iii) 25.1/9.3 = 2.7 g/cm^3 (e.c.f.) **[1]**

(b) (i) 110 cm^3, 10 cm^3 (both needed for mark, no tolerance) **[1]**

(ii) 20 cm, 40 cm (reject answers stated the wrong way round)
both needed for the mark. **[1]**

(iii) 50 x 20 = mass x 40, (e.c.f.)
mass = 25 g (e.c.f.) (1) **[1]**

(iv) 25/10 = 2.5 g/cm^3 (e.c.f.) **[1]**

(c) EITHER method 2 is more accurate because the cube in method 1 is not accurately formed (1) so measurement of the side is inaccurate (1)
OR the scale of the measuring cylinder used in method 2 is not fine enough (1)
so accuracy of measuring volume is low (1) therefore method 1 is more accurate

N.B. Note that the 2 marks can be awarded if an inaccuracy is referred to

if the candidate claims that e.g. 'finding the volume by displacement is more accurate' then award 1 mark maximum

(no mark for an answer without a reason) **[2]**

[Total: 10 marks]

3 **(a)** **(i)** water will suck back into the tube OWTTE **[1]**

(ii) the tube cools down (1) and gas (air) inside contracts OR the gas dissolves in water/ pressure is lower so air pressure forces water in (1) **[2]**

(b) 87 cm^3 (+/- 1 cm^3) **[1]**

(c) **(i)** take cylinder out of the water (and pour out the water from the cylinder) then pour in some lime-water (or way of sampling the gas) (and shake)

(N.B. the practical detail must be given) **[1]**

(ii) carbon dioxide/CO_2 **[1]**

(d) **(i)** greenish blue, blue/dark green **[1]**

(ii) blue/blue-purple/purple (must show sensible difference from previous answer)
(look out for continental centres using a different indicator) **[1]**

(e) diagram showing syringe (1)
syringe shown with graduations (1)
(graduations on any other apparatus not credited) **[2]**

[Total: 10 marks]

4 (a)

group	loss of mass/g
A	0.3
	0.4
	0.3
B	0.3
	0.2
	0.2
C	0.2
	0.1
	0.1
D	0.0
	0.1
	0.0

all correct or only 1 error (2) 2-3 errors (1) 4 or more errors (0)
(accept numbers shown with no 0, e.g. .3, .4 etc.) **[2]**

(b) (i)

group	working out	average mass lost/g
A	0.3+0.4+0.3/3	0.33
B	0.3+0.2+0.2/3	0.23
C	0.2+0.1+0.1/3	0.13
D	0 + 0.1 + 0/3	0.033

(errors carried forward) (accept answers given as .33, .23 etc.)
(accept 1st d.p. shown in A-C, 2nd d.p. shown in D) **[4]**

(ii) yes: more mass lost if no grease used/less mass lost if greased/correct use of data to show this **[1]**

(iii) lower surface allows greater loss of water (1) correct use of data to show that group B lost more than group C(1) **[2]**

(c) more stomata present <u>on the lower surface</u>
(accept the word 'pores' instead of stoma/stomata)
(answers based on description of a waxy cuticle on the upper surface must be convincing) **[1]**

[Total: 10 marks]

5 (a) 7.3, 13.9, 20.0 (+/- 0.1 ^{o} C)
the first d.p. <u>must</u> be shown **[3]**

(b) all points plotted correctly (1)
line drawn through points (1)
showing sudden rise, not appreciably curved at change of slope (1)
(if the candidate plots the temperature 0 ^{o}C on the –10 ^{o} line, but no other error, deduct 1 mark only) **[3]**

(c) (i) melting ice kept temperature down/used up energy/some ice is still present in the mixture **[1]**

(ii) about 51 cm^3 (or answer from candidate's graph)
(ignore the omission of 'M' from the graph) **[1]**

(d) 51 x 80 x 4.2 (e.c.f.) (1) = 17 136 J (1)
(if one of the substituted quantities is incorrect, –1 mark: if they are both incorrect, no marks awarded even if the subsequent calculation is correct) **[2]**

[Total: 10 marks]

6 **(a)** **(i)** water **[1]**

(ii) it condenses (in the cold water) **[1]**

(b) 12.3 cm^3 (no tolerance) **[1]**

(c) 8.0 cm^3 (+/- 0.1 cm^3) (accept '8') **[1]**

(d) 12.3 – 8.0 = 4.3 cm^3 (e.c.f.) **[1]**

(e) 4.3 x 100/12.3 (e.c.f.) (1) = 35% (1) **[2]**

(f) **(i)** oxygen is more soluble than nitrogen in water (1)

comparison of percentage in boiled-out air and in ordinary air, use of data to show this (1) (answer depends on candidate's answer to **(e)**) **[2]**

(ii) greater percentage of oxygen helps respiration in aquatic plants and animals
(reject: 'animals cannot breathe' 'need oxygen to live' etc.) **[1]**

[Total: 10 marks]