

Physical and Chemical Changes

Mark Scheme

Level	IGCSE
Subject	Chemistry
Exam Board	CIE
Topic	Chemical Reactions
Sub-Topic	Physical and Chemical Changes
Paper Type	Alternative to Practical
Booklet	Mark Scheme

Time Allowed: 71 minutes

Score: /59

Percentage: /100

- 1 total volume of water boxes correctly completed (1)
10, 11, 12, 13, 14
temperature boxes completed (4) –1 each incorrect
68, 63, 59, 55, 51 [5]
- (a) appropriate scale for y-axis (1)
points plotted correctly (4), –1 for each incorrect
best fit straight line graph (1) [6]
- (b) clear liquid formed / no solid visible owtte [1]
- (c) value from graph for 9 cm³ of water, around 72 °C (1)
extrapolation of straight line shown (1) [2]
- (d) temperatures at which crystals appear lower (1)
solution more dilute in same volume of water / less saturated owtte (1) [2]
- (e) sketch graph below line (1) label (1) [2]
- (f) one improvement from e.g.
don't use a beaker of cold water to cool solution /
do not remove thermometer from the solution /
use second person or IT method to note formation of crystals /
repeat

linked explanation
different rate of heat losses /
loss of solid on thermometer /
observing formation of first crystals may vary /
average
mean more accurate / increases reliability [2]
not just accurate

[Total: 20]

2 (a) Table of results

Initial boxes correctly completed (1)	24
	26
	21
	29

Final boxes correctly completed (1)	27
	22
	11
	23

Differences correctly completed (1)	+	signs correct (1)	
	-		
	-1		
	-6		[4]

(b) all 4 bars correctly drawn (3), -1 for each incorrect labelled (1) [4]

(c) (i) solid **A**/Experiment 1 [1]

(ii) temperature increased/heat given out [1]

(d) Experiment 3 [1]

(e) double the value or $(-)$ 8°C e.c.f. [1]

(ii) half the value or $(-)$ 3°C e.c.f. [1]

(iii) more/larger volume of water (1) twice as much (1) for solid to dissolve in [2]

(f) acid present (1) carbonate present (1) carbon dioxide (1) [max 2]

[Total: 17]

- 3 (a) Points plotted correctly (3), -1 for each incorrect smooth curve (1) not a straight line [4]
- (b) 47 ± 1 or reading from graph (1) curve extrapolated on grid (1) [2]
- (c) solid/crystals form owtte (1) 20g (1) not solubility decreases [2]

[Total: 8]

- 4 (a) (i) correct indication for crystals (1)
- (ii) correct indication of heat (1) no labels but correct position max 1 [2]
- (b) to cool/condense the water/gas/liquid (1) [1]
- (c) blue (1) to white/grey (1) [2]

5 (a)	pipette / burette	(1)	1	
(b)	name (1)	^{not} eg methyl orange phenolphthalein.	Universal Indicator, litmus	1
In (b)	colour change (2)	}	yellow (1) to orange (1) / pink (1) blue (1) → purple (1) / red (1) pink (1) to colourless (1)	2
(c)	The acid (1) less needed to neutralise the KOH (1)			2
(d)	repeat experiment (1) without indicator (1) / charcoal evaporate solution (1) to crystallising point (1)		max 3	3
	no indicator = max 2 Answer			