

Name of the Student: _____

Max. Marks : 22 Marks

Time : 22 Minutes

Mark Schemes

Q1.

- (a) Correct completion of table
(7.2 – 9.4 – 10.3 – 11.5 – 12.2 – 13.1)

Any error loses the mark.

1

Appropriate scales for axes

No penalty for missing labels but the graph must cover at least half of the available area.

1

All points plotted correctly

Allow ± 1 small square.

1

Line of best fit acceptable

Must be a reasonably smooth curve but make allowance for freehand drawing passing within one small square of each point.

Do not penalise minor doubling of line.

1

- (b) Maximum mass at $(44.0 / 4) = 11.0$ g
giving a max. pressure of 1.7 ± 0.1 MPa

Allow this pressure range only.

Check that candidate's answer matches graph.

1

- (c) 7.2 g of NaCl in 250 cm^3 represents 28.8 g dm^{-3}

Allow 0.49 but not 0.5; otherwise do not penalise precision of answer

1

Molarity = $0.492 \text{ mol dm}^{-3}$

Conseq. to their graph value for 100 kPa to 2 or 3 sig.

1

- (d) Measuring cylinder = $(1 / 250) \times 100 = 0.4\%$

Balance = $(0.1 / 7.2) \times 100 = 1.4\%$

Both values correct for the first mark.

Balance error conseq. on their 100 kPa mass value.

Ignore precision of answers.

1

Combined error 1.8%

When error being calculated is **not** stated, allow **if** the calculations are in the same order as in the question (measuring cylinder, balance).

If only combined error given then 1 mark only.

1

- (e) (i) The points are good enough to be able to draw a smooth curve because the line passes through / close to all points.

Mark consequentially on candidate's graph

1

- (ii) There are no anomalous points

Mark consequentially on candidate's graph

1

- (f) The experiment only seeks an approximate figure for the maximum pressure

Allow words to that effect.

1

- (g) (i) Toxic (to marine life)

Allow phrasing which implies a detrimental effect on marine ecology.

1

- (ii) Mixing the effluent with (sea) water to dilute it

Penalise any method which removes the salt or which implies storage.

1

- (h) $2\text{Br}^- + \text{Cl}_2 \rightarrow 2\text{Cl}^- + \text{Br}_2$

Allow NaBr or KBr

1

- (i) The cost of removing water / heating would be too high

Discount answers based on toxicity or speed of reaction.

Allow answers based on cost of using sulfuric acid.

1

- (j) (i) Carbon

Allow C, soot, graphite, coal.

1

- (ii) Formed by the decomposition of organic material / living organisms in the sea water

Allow 'erosion of coal beds'.

1

- (iii) Dissolve the solid formed in water

Do not allow melting of the solid.

1

Filter off the insoluble particles

1

- (k) $\text{Ca}(\text{OH})_2 + 2\text{HCl} \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O}$

Allow $\text{Ca}(\text{OH})_2 + 2\text{H}^+ \rightarrow \text{Ca}^{2+} + 2\text{H}_2\text{O}$

Allow multiples.

1

- (l) In agriculture / to raise the pH of soil / (Lime-based) mortars in construction

Allow words to that effect.

1

