

Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Rate Equations

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Mark Schemes

Q1.

- (a) Log (1 / time) on the y-axis + log (vol) on x-axis

If axes unlabelled use data to decide that log (1 / time) is on the y-axis

1

Sensible scales

Lose this mark if the plotted points do not cover at least half of the paper

Lose this mark if the graph plot goes off the squared paper

Lose this mark if plots a non-linear / broken scale

Lose this mark if uses an ascending y-axis of negative numbers

1

Plots points correctly $\pm$ one square

1

Line through the points is smooth

Lose this mark if the candidate's line is doubled

1

Line through the points is best fit – ignores last point

Must recognise that point at 25 cm^3 is an anomaly

If wrong graph, mark consequentially on anomaly if correctly plotted.

*A kinked graph loses smooth **and** best fit marks*

1

- (b) Uses appropriate x and y readings

Allow taken from table or taken or drawn on graph

$$\frac{1.65 - 1.2}{1.4 - 0.9}$$

Must show triangle on graph or such as

1

Correctly calculates gradient 0.95 ± 0.02

Ignore positive or negative sign

Correct answer only with no working scores this mark

1

Answer given to 2 decimal places

1

- (c) First order or order is 1

Allow consequential answer from candidate's results

- (d) Thermostat the mixture / constant temperature / use a water bath
or Colorimeter / uv-visible spectrometer / light sensor to monitor colour change

1

Reaction / rate affected by temperature change
or Eliminates human error in timing / more accurate time of colour change

1

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Q2.

(a) $k = \text{rate}/[\text{CH}_3\text{CH}_2\text{COOCH}_3][\text{H}^+]$

1

or

$$= \frac{1.15 \times 10^{-4}}{(0.150)(0.555)}$$

$$= 1.38 \times 10^{-3} \text{ to } 1.4 \times 10^{-3}$$

1

$$\text{mol}^{-1} \text{ dm}^3 \text{ s}^{-1}$$

1

(b) $\text{ans} = \text{rate constant} \times (\frac{1}{2} \times 0.150) \times (\frac{1}{2} \times 0.555)$

ignore units

$$= \text{rate constant} \times 0.0208$$

$$2.88 \times 10^{-5}$$

$$(1.38 \times 10^{-3} \text{ gives } 2.87 \times 10^{-5})$$

$$\text{Allow } 2.87 - 2.91 \times 10^{-5} (1.4 \times 10^{-3} \text{ gives } 2.91 \times 10^{-5})$$

1

(c) $[\text{H}^+] = \text{rate} / k[\text{CH}_3\text{COOCH}_2\text{CH}_3]$

1

$$= \frac{4.56 \times 10^{-5}}{(8.94 \times 10^{-4})(0.123)}$$

$$= 0.415 (0.4146)$$

1

pH = 0.38 mark independently

$$[\text{H}^+] = 0.41 \text{ gives } \text{pH} = 0.39$$

1

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