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

Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Mark Schemes

Q1.

(a) 111(.1)

Allow an answer to a finite number of sig figs (that is correctly rounded)

Allow 110

Do not allow answers with recurring dot above number (ignore dots after the final number)

1

(b) temperature

1

(c) Measure the temperature at the start and end of the reaction and find the mean/average

Measure the temperature at regular intervals during the reaction and find the mean/average

Allow idea of doing the reaction in a water bath

1

(d) **M1** suitable vertical scale

***M1** should use more than half the axis to cover the four points given and the point for 67°C (if plotted)*

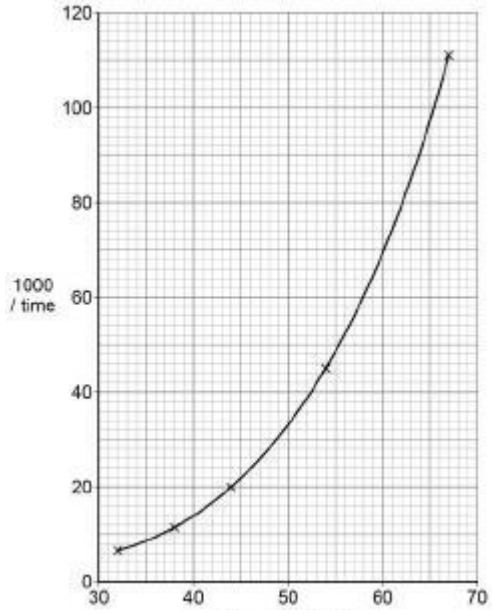
1

M2 points plotted correctly (±½ small square per point)

***M2** allow ECF for plotting of point found in part (a) (if no value found in part (a) allow graph that omits this)*

1

M3 best fit line drawn (within one small square of each point and should be a smooth curve)



M3 *allow ECF for a line based on their plotted points, but only where the line continues to rise throughout the temperature range*

1

(e) $\text{Time} = \frac{1000}{\text{value from graph at 60°C}}$

Answers should be at least 2 sf

Working needs to be shown that includes a value from the graph at 60 °C and/or construction line(s) showing 1000/t at 60 °C on the graph

Use the value their line shows at 60 °C (±½ small square)

1

(f) **M1** many more particles/ions have (energy ≥) activation energy

M1 *need the idea that it is many / much more particles; allow reference to atoms / molecules instead of particles / ions*

1

M2 more successful collisions per unit time / greater frequency of successful collisions

M2 *allow higher proportion of the collisions are successful*

1

[9]

Q2.

(a) **M1** High**er**/**est** concentration of / more H_2O_2 / particles / molecules / reactants

1

M2 More frequent successful collisions

1

Alternative approach

M1 *Low**er**/**est** concentration of / fewer particles / molecules / reactants as time goes on*

M2 *Less frequent successful collisions (look for both ideas even if separated)*

Ignore *'chance' / 'probability'*

(b) **M1** Suitable tangent drawn

M1 *Tangent must be drawn with ruler and touch line at 0.05 mol dm^{-3} (± 1 square) and not cross the curve (if white seen between lines it crosses)*

1

M2 **−**0.00120 to –0.00155 (mol dm^{-3} s^{-1})

M2 Ignore *units*

Allow *ecf from unsuitable tangent i.e if M1 not awarded*

Ignore *sign of gradient*

1

(c) **M1** $[H_2O_2]_{initial}$ = 0.083 mol dm^{-3}

Allow *0.082 − 0.084*

1

M2 $[H_2O_2]_t$ = 0.0664 (mol dm^{-3})

Allow *0.0656 − 0.0672 (scores 2/2)*

2SF minimum

Allow *ecf from **M1** (M2 = M1 × 0.8)*

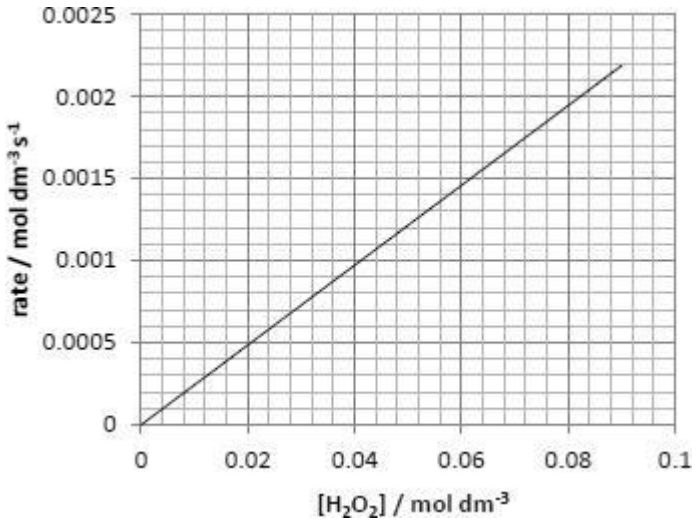
1

(d) **M1** Points plotted

M1 *allow each point (± 1/2 square)*

1

M2 best fit straight line drawn



M2 *line should be drawn with a ruler and cover the five points given*

going within 1 square of each point, no doubles no kinks. The line does not need to be extended to the origin

Allow *reasonable best fit line if points plotted incorrectly*

1

(e) **M1** 1st order

1

M2 straight line graph through the origin

Ignore *rate is (directly) proportional to* $[H_2O_2]$

Allow *constant gradient line through the origin*

Allow *use of data from line to show e.g. x2 conc = x2 rate*

Allow *if M1 missing*

Not *if M1 wrong*

1

[10]

Q3.

(a) Number of molecules (with a particular energy)

Ignore particles / atoms

Allow amount or fraction or proportion for number

1

(b) There are no molecules with no energy

All molecules / particles have some energy

Allow particles / atoms

1

(c) Most probable / common / modal energy

1

(d) **M1** Peak should be at same energy (i.e. in line with X)

***M1** and **M2** marked independently*

1

M2 Overall area should be half the original area; after diverging from the origin, the second line should not touch the first line

***M2** area should be about half of the original*

1

[5]