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

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Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Mark Schemes

Q1.

(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

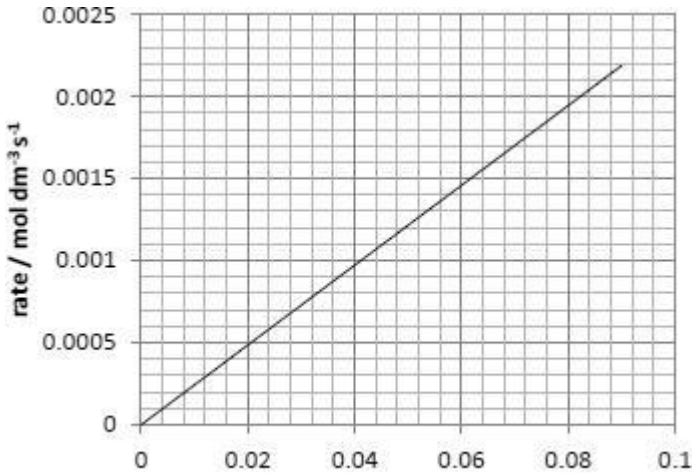
(d) **M1** Points plotted

M1 *allow each point (± 1/2 square)*

1

M2 best fit straight line drawn

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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

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Q2.

(a) The sodium hydrogencarbonate solution neutralises the acid (catalyst)

M1

So stops the reaction

M2

(b) The concentration/amount of propanone is much larger than/200 times larger than the concentration/amount of iodine

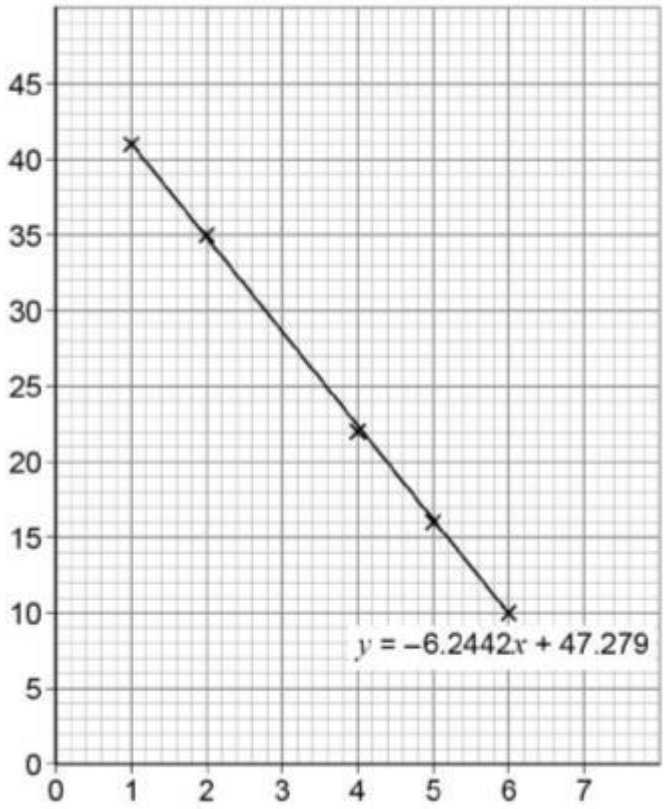
M1

Concentration of propanone is (almost) constant

The change in concentration in propanone is negligible

M2

(c)



M1

Suitable axes (plotted points must take up at least half of the grid)

M2

For all points correctly plotted to ± $^1/_2$ small square

For straight line of best fit which avoids the anomalous plot M1

M3

(d) The graph is a straight line / has a constant gradient

M1

So the rate of reaction does not change as the concentration (of iodine) changes / the iodine is being used up at a constant rate.

Correct rate vs conc graph scores M2

M2

(e) Gradient = (−14.1 − −2.8) / (0.00180 − 0.00128)
= −11.3 / 0.00052
= −21731

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Allow -21330 to -22130

M1

Gradient = $-E_a$ / R
$-E_a$ = their answer x 8.31 (= 180583 J mol^{-1})

M2

E_a = M2 ÷ 1000 (= 181 kJ mol^{-1})

M3

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