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

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**Name of the Student**:_____
**Max. Marks : 27 Marks** **Time : 27 Minutes**

Mark Schemes

Q1.

(a) $1.75 \times 10^{-3}$ AND -6.46

*Allow 0.00175*

*NOT other sig figs (e.g. 1.7 x $10^{-3}$, -6.5)*

*NOT 1.74 x $10^{-3}$*

**1**

(b) **M1** Unit of *k* (is $s^{-1}$)

*Mark independently*

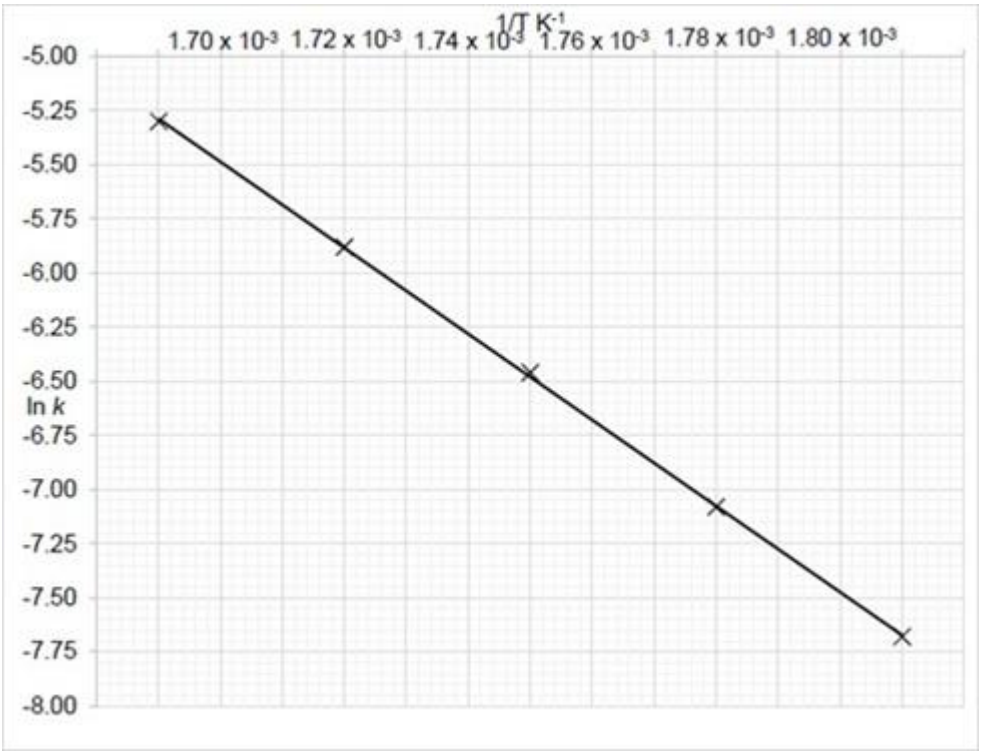
*M1 Allow $s^{-1}$ or k / $s^{-1}$ or k in $s^{-1}$*

*NOT just k*

**M2** (Order) 1/first

**2**

(c)




**M1** Points plotted (all within half a square) (ECF from (a) for 3rd point including if no values in the table)

**M2** Best fit straight line (line within one square of each point) (best fit line - points above and below - based on their plotted points)

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**2**

(d) **M1** Gradient (expected value = -19900)

*Answer of (+)161 to (+)170 gets 3/3*

*Allow range from -19400 to -20400 from correct plotting and best fit line*

*ECF from any straight line*

**M2** $-\frac{E_a}{R}$ = gradient

*can be implied by calculation shown e.g.*
*$E_a$ = -M1 × 8.31 gets M2*

**M3** $E_a = \frac{-M1 \times 8.31}{1000}$ = (+)165 (kJ mol$^{-1}$)

*Allow negative $E_a$ if positive gradient in M1*

**3**

(e) **M1** (alkene) $CH_2$=$CHCH_3$

**M2** (carbonyl) $(CH_3)_2CO$ / $CH_3COCH_3$

*Allow any correct structural representations*

*C=C must be shown*

*Allow $C(CH_3)_2O$*

*If correct two structures are given but the wrong way round, then scores 1 mark*

**2**

**[10]**

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Q2.

(a) M1 Relative rate = 1.00

M2 [B] = 0.16

M3 Relative rate = 1.35

**3**

(b) M1 Step 2

M2 (By the end of step 2) 1 × $H^+$ and 2 × B have been used

*Allow slowest step*

**2**

**[5]**

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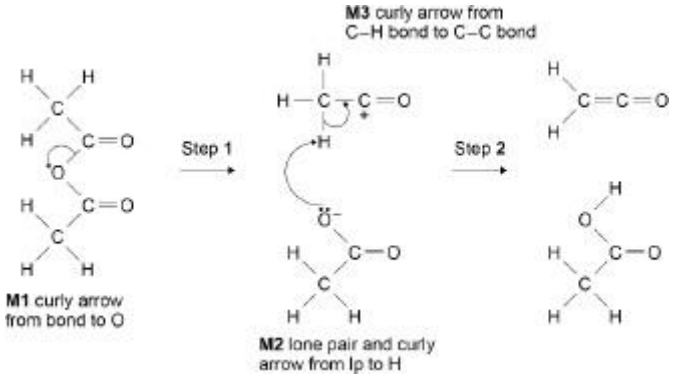
Q3.

(a) $C_nH_{2n-2}O$

*Allow $C_nH_{2n}CO$ or $(CH_2)_nCO$ or $C_nH_{2(n-1)}O$*

**1**

(b)




*Allow other C-O bond breaking for M1*

**3**

(c) M1 $\frac{k}{A} = e^{-Ea/RT}$

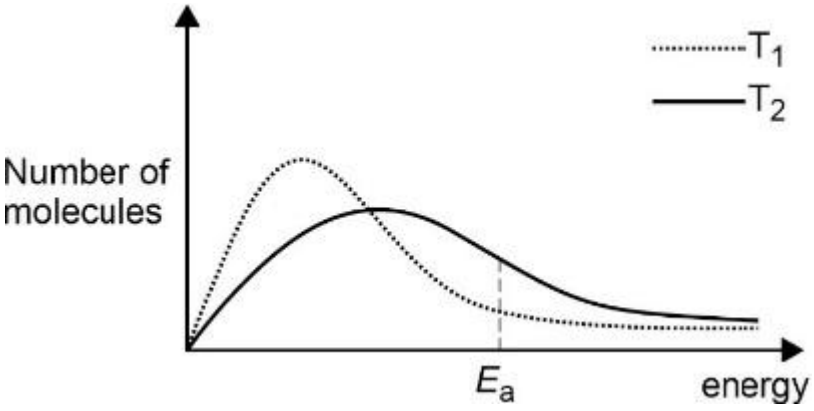
M2 $8.302 = \frac{34500}{8.31 \times T}$

M3 T = 500 K

*OR via ln k = ln A - $\frac{Ea}{RT}$ or shown with numbers*

**3**

(d)




M5 At $T_2$ (many) more particles have $E \geq E_a$

*M1 x axis labelled correctly (kinetic not required)*

*AND y axis labelled correctly allow particles*

*M2 Ea labelled on x axis*

*M3 Distribution correct shape for $T_1$*

*M4 Peak at $T_2$ lower with max shifted right and only crosses once*

**5**

**[12]**

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