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

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Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Mark Schemes

Q1.

(a) propyl methanoate;

$HCOOC_3H_7 + OH^- \rightarrow HCOO^- + C_3H_7OH$ **1**

OR

$HCOOC_3H_7 + NaOH \rightarrow HCOONa + C_3H_7OH$; **1**

(b) order wrt A = 1; **1**

order wrt NaOH = 1; **1**

Initial rate in Exp 4 = 2.4×10^{-3}; **1**

(c) (i) r(ate) = k[A]

OR

r(ate) = k[A][NaOH]^0;

(penalise missing [ ] but mark on)
(penalise missing [ ] once per paper)
(if wrong order, allow only units mark conseq on their rate eqs)
(penalise k_a or k_w etc) **1**

(ii) $k = \frac{9.0 \times 10^{-3}}{0.02}$; **1**

= 0.45; **1**

s^{-1}; **1**

(iii) (large) excess of OH^- or $[OH^-]$ is large/high; **1**

$[OH^-]$ is (effectively) constant

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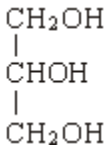
OR

[A] is the limiting factor *(Q of L mark)*

1

(d) (i)



1

propan(e)-1,2,3-triol

OR

1,2,3-propan(e)triol

OR

Glycerol;

1

(ii) $CH_3(CH_2)_{16}COONa$ or $C_{17}H_{35}COONa$ or $C_{18}H_{35}O_2Na$;
(ignore 3 in front of formula but not if indicating trimer)

1

(not just anion and penalise Na shown as covalently bonded) soap - allow with detergent but not detergent alone;

1

[15]

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Q2.

(a) order with respect to **P** is 2

1

order with respect to **Q** is 1

1

(b) (i) rate = k**[R][S]**^{2}

(if wrong expression, no further marks)

1

rate = $(4.2 \times 10^{-4}) \times 0.16 \times 0.84^2$

1

$= 4.7 \times 10^{-5}$ (mol dm^{-3} s^{-1})

ignore units even if wrong

1

(ii) $$k = \frac{\text{rate}}{[R][S]^2} = \frac{8.1 \times 10^{-5}}{0.76 \times 0.98^2}$$

1

$= 1.1 \times 10^{-4}$

1

(iii) T_1

**If calculated value for $k > 4.2 \times 10^{-4}$, then answer to (iii) is T_2*

1

[8]

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