Name:	Student code:

Laboratory Task I 50 points

RESULTS SHEET

A. Standardisation of Iodine Solution

Concentration of standard $Na_2S_2O_3$ in bottle : ..... 0.01970..... M

	Volume		
Titration Number	**1**	**2**	**3**
aliquot of I_2 (mL)	5.00	5.00	5.00
initial buret reading (mL)	0.00	0.00	0.00
final buret reading (mL)	10.00	10.05	9.95
standard $Na_2S_2O_3$ (mL)	10.15	10.10	10.05

The value of titre = [ ] mL

Calculation for iodine concentration:

mol ratio of $I_2 : S_2O_3^{2-}$ = 1:2

$$I_2 + 2\ S_2O_3^{2-} \longrightarrow 2I^- + S_4O_6^{2-}$$

$$[I_2].V_{I_2} = \frac{[S_2O_3^{2-}].V_{S_2O_3^{2-}}}{2}$$

$$[I_2] = \frac{0.01970 \text{ x } 10.10}{2 \text{ x } 5.00} = 0.0199 \text{ M}$$

1 mark for correct mol ratio.
max 2 marks for correct calculation.
-1 mark for less than 2 or more than 3 significant figures.

Concentration of I_2 [0.0199] M

Accuracy (max 7 marks)-recalculated using student's data 7 marks
Sliding scale 7 marks for 0 to 0.5 % deviation.
0 mark for greater than 3.0 % deviation.

Name: Student code:

Laboratory Task I

B. A kinetic study of the acid catalyzed reaction between acetone and iodine in aqueous solution

B-1. Calculation for initial concentrations (M) in the solution mixtures

	Concentration			
Flask No.	**I**	**II**	**III**	**IV**
$[I_2]$, M	0.00498	0.00998	0.00498	0.00498
[acetone], M	1.69	1.69	3.39	1.69
[HCl], M	0.0250	0.0250	0.0250	0.0500

0.25 mark for each correct concentration of I_2 and HCl.
0.5 mark for each correct concentration of acetone.

B-2. Calculation for the concentration (M) of iodine remaining in Flasks I to IV at 7 minutes.

	Volume			
Flask No.	**I**	**II**	**III**	**IV**
initial buret reading (mL)	0.00	0.00	0.00	0.00
final buret reading (mL)	8.35	18.55	6.75	6.85
standard $Na_2S_2O_3$ (mL)	8.35	18.55	6.75	6.85

$[I_2]$ remaining at 7 minutes (M)	0.00412	0.00914	0.00332	0.00338

0.5 mark for each correct calculation of remaining iodine.

B-3. Calculation for initial rate of disappearance of I_2 at 7 minutes for Flasks I to IV (in M s^{-1})

$$\text{Initial rate of disappearance of iodine (M s}^{-1}) = -\frac{d[I_2]}{dt}$$

Flask No.	**I**	**II**	**III**	**IV**
Calculation for rate	$\frac{0.00498-0.00412}{7 \times 60}$	$\frac{0.00997-0.00914}{7 \times 60}$	$\frac{0.00498-0.00333}{7 \times 60}$	$\frac{0.00498-0.00338}{7 \times 60}$
Initial rate	2.05×10^6	1.98×10^6	3.95×10^6	3.811×10^6

4 marks for correct calculation.

Name:	Student code:

B-4. Calculation for the kinetic orders x, y and z

$$\text{rate} = -\frac{d[I_2]}{dt} = k[CH_3COCH_3]^x [I_2]^y [H^+]^z$$

Calculation for x	**Calculation for y**	**Calculation for z**
$\frac{\text{Rate (III)}}{\text{Rate (I)}} = \frac{3.95 \times 10^{-6}}{2.05 \times 10^{-6}}$	$\frac{\text{Rate (II)}}{\text{Rate (I)}} = \frac{1.98 \times 10^{-6}}{2.05 \times 10^{-6}}$	$\frac{\text{Rate (IV)}}{\text{Rate (I)}} = \frac{3.81 \times 10^{-6}}{2.05 \times 10^{-6}}$
$2^x = 1.93$	$2^y = 0.965$	$2^z = 1.86$
$x = 0.95$	$y = -0.051$	$z = 0.90$
x = 1 (integer)	y = 0 (integer)	z = 1 (integer)

max 1 mark for each correct calculation

Write rate equation or rate law

Rate = $k[CH_3COCH_3][H^+]$

2 marks

B-5. Calculation for the rate constant, k, for Flasks I to IV with proper unit.

Flask No.	**I**	**II**	**III**	**IV**
Calculation	$\frac{2.05 \times 10^{-6}}{(1.69)(0.0250)}$	$\frac{1.98 \times 10^{-6}}{(1.69)(0.0250)}$	$\frac{3.95 \times 10^{-6}}{(3.39)(0.0250)}$	$\frac{3.81 \times 10^{-6}}{(1.69)(0.0500)}$
Rate Constant k =	4.85×10^{-5}	4.68×10^{-5}	4.66×10^{-5}	4.51×10^{-5}
Unit	$M^{-1} s^{-1}$	$M^{-1} s^{-1}$	$M^{-1} s^{-1}$	$M^{-1} s^{-1}$

Max 0.5 mark for each correct calculation.
1 mark for correct unit.

B-6. Mean value of rate constant = 4.68×10^{-5}

22 marks

Accuracy: (max 22 marks)-recalculated using student's data.
Sliding scale 22 marks for 0 to 6% deviation.
0 mark for greater than 18% deviation.
0 mark for greater than ±10% deviation.