THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

032/2B **CHEMISTRY 2B**

(ACTUAL PRACTICAL B)

(For Both School and Private Candidates)

Time: 2:30 Hours **ANSWERS** **Year: 2012**

Instructions

1. This paper consists of two questions.

2. Answer all questions.

1. You are provided with the following solutions:
C: Containing 9.13 g/dm³ of HX acid
D: Containing 1.00 g of sodium hydroxide in 0.25 dm³ of solution
Methyl orange indicator

Questions

(a) With state symbols, write a balanced chemical equation for the reaction between solution C and D.
$HX(aq) + NaOH(aq) \text{----> } NaX(aq) + H_2O(l)$

(b) Titrate the acid (in burette) against the base (in a conical flask) using two drops of your indicator and obtain three titre values.
Assume average titre volume = 25.00 cm³ of C used for 25.00 cm³ of D.

(c) (i) ___ cm³ of acid required ___ cm³ of base for complete reaction.
25.00 cm³ of acid required 25.00 cm³ of base.

(ii) Showing your procedures clearly, identify element X in acid HX.
1.00 g NaOH in 0.25 dm³ → 4.00 g/dm³
Molarity of NaOH = 4 ÷ 40 = 0.1 mol/dm³
Moles in 25 cm³ = 0.1 × 0.025 = 0.0025 mol
So, moles of HX = 0.0025 mol
Mass of HX in 1 dm³ = 9.13 g
Molar mass = 9.13 ÷ 0.0025 = 365.2
HX → Molar mass = 1(H) + X = 365.2 → X = 364.2
So, X is likely to be iodine (I), making HX = HI
2. You are provided with:
E: 0.1 M sodium thiosulphate
G: 2 M hydrochloric acid

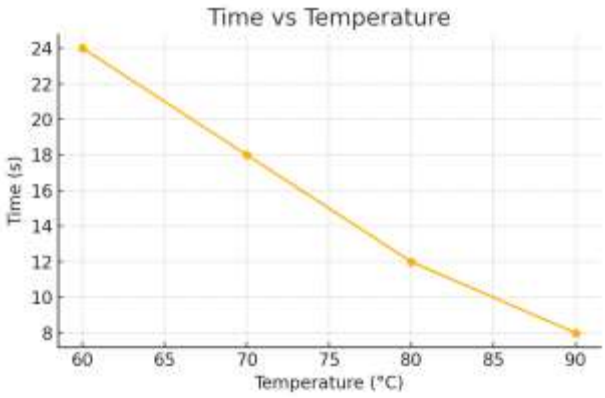
Questions

(a) Why solution E was put into water bath?
To raise its temperature so that the reaction rate could be studied at different temperatures.

(b) Write a balanced equation for reaction between E and G.
$Na_2S_2O_3(aq) + 2HCl(aq) \text{----> } 2NaCl(aq) + S(s) + SO_2(g) + H_2O(l)$

(c) What is the product which causes the solution to cloud the letter X?
The sulphur precipitate (S) causes the cloudiness.

(d) Draw a graph of time against temperature.



(e) Comment on the shape of the graph in relation to the rate of this reaction.
As temperature increases, time decreases. This means the reaction proceeds faster at higher temperatures, confirming that increasing temperature increases rate of reaction.

3. Sample J is a simple salt containing one cation and one anion.

S/N	Experiment	Observation	Inference
(a)	Observe the appearance of sample J	White crystalline solid	Ionic salt
(b)	Perform a flame test	Green flame	Presence of Cu^{2+}
(c)	Dissolve sample in water and shake	Dissolves	Soluble salt
(d)	Heat dry sample	No change	No water of crystallization
(e)	Add conc. H_2SO_4 dropwise	White fumes evolved	Presence of chloride ion
(f)(i)	Add NaOH to 1st portion	Blue precipitate	Confirms Cu^{2+}
(f)(ii)	Add NH_3 to 2nd portion	Deep blue solution formed	Confirms Cu^{2+}
(f)(iii)	Add $BaCl_2$ followed by HCl to 3rd portio	No precipitate	No sulphate ion

Conclusion
(i) The cation in sample J is Cu^{2+} and anion is Cl^-
(ii) Show the reaction that took place in (f)(i):
$Cu^{2+}(aq) + 2OH^-(aq) \text{ ----> } Cu(OH)_2(s)$