THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
DIPLOMA IN SECONDARY EDUCATION EXAMINATION

732/2B **CHEMISTRY 2B**

(ACTUAL PRACTICAL B)

Time: 3 Hours **ANSWERS** **Year: 2014**

Instructions.

1. This paper consists of **three (3)** questions.
2. Answer **all** questions
3. Question number 1 carries 20 marks and the rest carry 30 marks.
4. Cellular phones are **note** allowed in the examination room.
5. Write your **examination Number** on every page of your answer booklet(s).

1. You are provided with:

N1: ethanoic acid (unknown concentration)

N2: sodium hydroxide solution, 4.0 g NaOH per dm^3

Phenolphthalein indicator

(a) The colour change observed is **pink to colourless**. Phenolphthalein is pink in basic solutions and turns colourless in acid when neutralized.

(b) Molar mass of NaOH = 23 + 16 + 1 = 40 g/mol

Concentration of NaOH = 4.0 ÷ 40 = **0.1 mol/dm^3**

Moles of NaOH in 25.0 cm^3 = 0.1 × 25.0 ÷ 1000 = **0.0025 mol**

(c) Balanced chemical equation:

CH_3COOH (aq) + NaOH (aq) → CH_3COONa (aq) + H_2O (l)

(d) From the equation, 1 mol of ethanoic acid reacts with 1 mol of NaOH

So moles of CH_3COOH = 0.0025 mol

Volume of N1 used = 25.0 cm^3 = 0.025 dm^3

Concentration of N1 = 0.0025 ÷ 0.025 = **0.1 mol/dm^3**

(e) Molar mass of CH_3COOH = 12 + 3(1) + 12 + 2(16) + 1 = 60 g/mol

Concentration in g/dm^3 = 0.1 × 60 = **6.0 g/dm^3**

(f) Phenolphthalein acts as a **pH indicator**. It shows the end point of the neutralization by changing colour.

2. You are given:

P1: potassium iodide

P2: hydrogen peroxide

P3: sulfuric acid

Starch solution

(a) The blue-black colour appears because **iodine (I_2)** is formed and reacts with starch to form a blue-black complex.

(b) Table completed:

Temperature (°C)	Temperature (K)	Time (s)
30	303	65

40	313	45
50	323	30
60	333	18
70	343	10

(c) Ionic equation:

H_2O_2 (aq) + $2I^-$ (aq) + $2H^+$ (aq) → I_2 (aq) + $2H_2O$ (l)

(d) As temperature increases, reaction rate increases, so **reaction time decreases**. Higher temperature increases particle kinetic energy, leading to faster collisions.

(e) The graph of temperature (K) vs time (s) would be a **downward curve**, showing that time decreases with increasing temperature.

(f) At 20°C (293 K), reaction time would increase. This is because particles have less kinetic energy, reducing the rate of effective collisions.

3. You are given salt **X**.

(i) Table of observations and inferences:

Test	**Observation**	**Inference**
Appearance	White crystalline solid	Ionic compound
Heating	Brown fumes, pungent smell	Nitrate (NO_3^-) present
Solubility	Soluble in water	Confirms ionic salt
NaOH (few drops)	Pale blue precipitate	Possible Cu^{2+}
NaOH (excess)	Precipitate remains	Confirms Cu^{2+}
Ammonia (few drops)	Light blue precipitate	Cu^{2+}
Ammonia (excess)	Deep blue solution forms	Confirms Cu^{2+}
$BaCl_2$ + HCl	No precipitate	No SO_4^{2-} or CO_3^{2-}
$AgNO_3$ + HNO_3	No precipitate	No halides

(ii) The cation is **Cu^{2+}** and the anion is **NO_3^-**, so salt **X** is **copper(II) nitrate ($Cu(NO_3)_2$)**.

(iii)

Cu^{2+} (aq) + 2NaOH (aq) → $Cu(OH)_2$ (s) + $2Na^+$ (aq)

(iv)

$Cu(NO_3)_2$ (aq) + Na_2CO_3 (aq) → $CuCO_3$ (s) + $2NaNO_3$ (aq)