JJAAJA CHEM
0705517234
0779856274

Candidates' Name: MR. BUKULWA JULIUS .....

Signature: .....

Random No.					Personal No.		

(Do not write your school / Center name or Number anywhere on this booklet)

545/3

CHEMISTRY

Paper 3

July / Aug 2024

2 ½ HOURS

KAMPALA TEACHERS EDUCATION CONSULTANCY

KAMTEC EXAMINATIONS BOARD

ENJOY A PRACTICAL = WEEKEND AS WE ARE WAITING FOR THE CBC CHEM SEMINAR ON 27/09/2024 AT BUKOTO SS IGANGA

Uganda Certificate Of Education

CHEMISTRY

Paper 3

TIME: 2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

*This paper consists of one **compulsory** item.*

Answers to this item are to be written in the spaces provided in this booklet.

Use blue or black ink All working must be clearly shown. A Graph paper will be provided

Mathematical tables and silent non-programmable scientific calculators may be used.

You are not allowed to use reference books.

Candidates are advised to carefully read the item, make sure they have all the apparatus and chemicals they may need and then plan appropriately before starting. .

FOR EXAMINER'S USE ONLY

ITEM	SCORE(S)	EXAMINER'S SIGNATURE
1		

Item 1

In a local village around Sukuru subcounty, in Tororo district, the water discharged into the valley dams from small industries contains traces of sulphuric acid which is unfavourable to the fresh water fish. The industry managers have been advised to use solution **KA_1** to neutralize the acid in the water without affecting the life of fish. This is because the reaction between **KA_1** and sulphuric acid may produce amounts of heat which is unfavourable, yet fresh water fish thrives well only if the heat change of **2.47 - 2.52kJ** occurs in water.

You are provided with the following;
Solution **KA_1**
Solution **KA_2** is a sample of the acidic fresh water.
Some apparatus

Task

(a) Design an experiment you can use to determine the amount of heat evolved in this reaction.

Aim: Experiment to determine the amount of heat evolved in the reaction between KA_1 and KA_2

Variables

Dependent	Temperature of the
Independent	Volume of KA_1
Controlled	Volume of KA_2 / Sample of freshwater

Hypothesis

The temperature of reaction will increase as KA_1 is added to KA_2

Tools

- Plastic beaker
- Thermometer
- Measuring cylinder.

Procedure

a) The initial temperature of KA_1 and KA_2 are noted and recorded using a thermometer
b) Using a measuring cylinder 15cm³ of KA_2 was measured into a plastic beaker.
c) Using another measuring cylinder 5cm³ of KA_1 was measured and then

transfered into a beaker containing 15cm³ of KA_2. Immediately a thermometre is put in reaction mixture.

d) The mixture is stirred with a thermometer and the maximum temperature obtained is noted and recorded.

e) Procedures (c) to (d) are repeated by adding KA_1 at regular intervals of 5cm³ such that volumes of KA_1 added equals to 10cm³, 15cm³, 20cm³, ~~and~~ 25cm³, 30cm³, 35cm³, 40cm³ and 45cm³

f) The results are tabulated including the temperature change (ΔT)

Risk	mitigation
The acid pouring into skin burns	wearing personal protective equipments.

(b) carry out the experiment you can use to determine the amount of heat evolved.

Initial temperature of KA_1 = 24.0°C

Initial temperature of KA_2 = 24.0°C

Average Initial temperature = $\frac{24.0+24.0}{2}$ = 24.0°C

Volume of KA_2 used = 15.0cm³

Volume of KA_1 used (cm³)	0	5	10	15	20	25	30	35	40	45
Maximum temperature attained °C	24.0	29.0	31.0	33.0	34.0	35.0	36.0	37.0	36.0	35.0
Temperature change.	0.0	5.0	7.0	9.0	10.0	11.0	12.0	13.0	12.0	11.0

Volume at maximum temperature = 35.0cm³

Maximum temperature change ΔT = 13°C.

(c) Analyse your results and hence draw possible conclusion.

Heat evolved = $MC\Delta T$

= (15+35) × 4.2 × 13

= 2730J

= 2.73kJ.

Conclusion; Basing on the heat evolved, at maximum temperature, the Industry manager should add volume of KA_1 less than 35cm³ to neutralize KA_2 such that less heat is evolved.