CONFIDENTIAL

In addition to the common reagents and apparatus used in chemistry laboratory, each student should be provided with the following;

1 burette of $50cm^3$ capacity	6 test tubes
1 pipette of $25cm^3$ (or $20cm^3$)	$100cm^3$ of FA1
2 filter papers	200 cm^3 of FA2
1 thermometer	200 cm^3 of 2M sulphuric acid
2 conical flasks	2.5g of Z
1 funnel	3.0g of W
1 volumetric flask of $250cm^3$ capacity	

Easy access to;

Weighing scale

Heat source

Reagents to identify cations and anions, gases

- FA1: 0.1M hydrated ammonium ferrous sulphate; $(NH_4)_2SO_4$. $FeSO_4.6H_2O$) made by dissolving 39.2g hydrated ammonium ferrous sulphate in one litre of distilled water.
- FA2: made by dissolving 3.16g potassium manganate (VII) in water to make one litre of solution.
- **2M** sulphuric acid
- Substance Z is $(NH_4)_2SO_4.FeSO_4.6H_2O$ **OR** a solid mixture of $(NH_4)_2SO_4$ + $FeSO_4$ in the ratio **2:1**
- Substance **W** is sodium oxalate ($Na_2C_2O_4$)

END

P525/2
CHEMISTRY
Paper 2
(Practical)
July - August 2026
3¼ hours

KAMSSA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education

CHEMISTRY

Paper 2
(Practical)
3 hours 15 minutes

Instructions to candidates

- *This examination paper consists of two compulsory examination items.*
- *Responses to these items must be written in the answer booklet provided.*
- *Begin each item on a fresh page.*
- *All working must be clearly shown. Graph papers will be provided*
- *Mathematical tables and silent non-programmable scientific calculators may be used.*
- *You are not allowed to use reference books (i.e, text books, booklets on qualitative and quantitative analysis, etc.)*

© 2026 Kampala Integrated Secondary Schools Examinations Bureau *Turn Over*

ITEM 1

At the Uganda industrial Research Institute (UIRI) in Nakawa, a team of researchers is developing a new water treatment process that utilizes potassium manganate (VII); ($KMnO_4$) to remove iron and manganese impurities from groundwater sources in rural Uganda. To ensure the effectiveness of the treatment process, the team needs to standardize the potassium manganate (VII) solution using a primary standard; hydrated ammonium ferrous sulphate; $(NH4)_2SO_4.\ FeSO4.\ 6H_2O)$ available in the laboratory. Additionally, they want to use the standardized potassium manganate (VII) to determine the molecular mass of an unknown oxalate compound, $X_2C_2O_4$, which is used as a scale inhibitor in industrial boilers.

The technician recommended using a redox titration between hot acidified oxalate solution at 60^0c (acidified with equal volume of sulphuric acid) with manganate (VII) solution. He further mentioned that the exact concentration of is between 0.018 and 0.022 and that molecular of the oxalate salt lies between 130 and 138.

Theory;

In acidic medium, MnO^-_4 oxidizes the Fe^{2+} and $C_2O_4^{2-}$ present in W according to the equation.

$MnO_4^-{}_{(aq)} + 5Fe^{2+}{}_{(aq)}\ 8H^+{}_{(aq)} \longrightarrow Mn^{2+}{}_{(aq)} + 4H_2O_{(aq)} + 5Fe^{3+}{}_{(aq)}$

$2MnO^-{}_{4(aq)} + 5C_2O_4^{2-}{}_{(aq)} + 16H^+{}_{(aq)} \longrightarrow 2Mn^{2+}{}_{(aq)} + 10CO_2{}_{(g)} + 8H_2O_{(l)}$

However, researchers lack some knowledge on how this can be done and have approached you for some guidance.

You are provided with the following;

FA1: 0.1M hydrated ammonium ferrous sulphate; $(NH_4)_2SO_4.FeSO_46H_2O$

FA2: Potassium manganate(VII) solution ($KMnO_4$) of unknown concentration

Solid W; which is $X_2C_2O_4$ used in water treatment (exactly 1.60g to be weighed and then dissolved in distilled water to make $250cm^3$ of solution, FA3)

2M sulphuric acid

a. Design and carry out an experiment to standardize potassium manganate (VII) and use it to determine molecular mass of W used in the inhibitor. (include; aim, hypothesis, variables, safety precautions, and procedure)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

b. Carry out the experiment. (include at least 3 data sets)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

c. Analyze and interpret your data and hence a recommendation.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

ITEM 2

In a peri-urban farming community near Mbarara, several residents have reported strange discoloration and a bad taste in water from their sole water source; river Rwizi. Environmental officers traced the problem to runoff from a fertilizer warehouse that leaked chemicals during heavy rains. A solid residue sample was collected from the drainage area near the warehouse.

As part of a school-community outreach project, your school's laboratory technician has given you a sealed container labeled Z from the affected site. Z is suspected to contain two cations and one anion that may have leached into the water supply. The solid is completely soluble in water. Your job is to investigate and identify the ions present using the reagents provided.

Task:

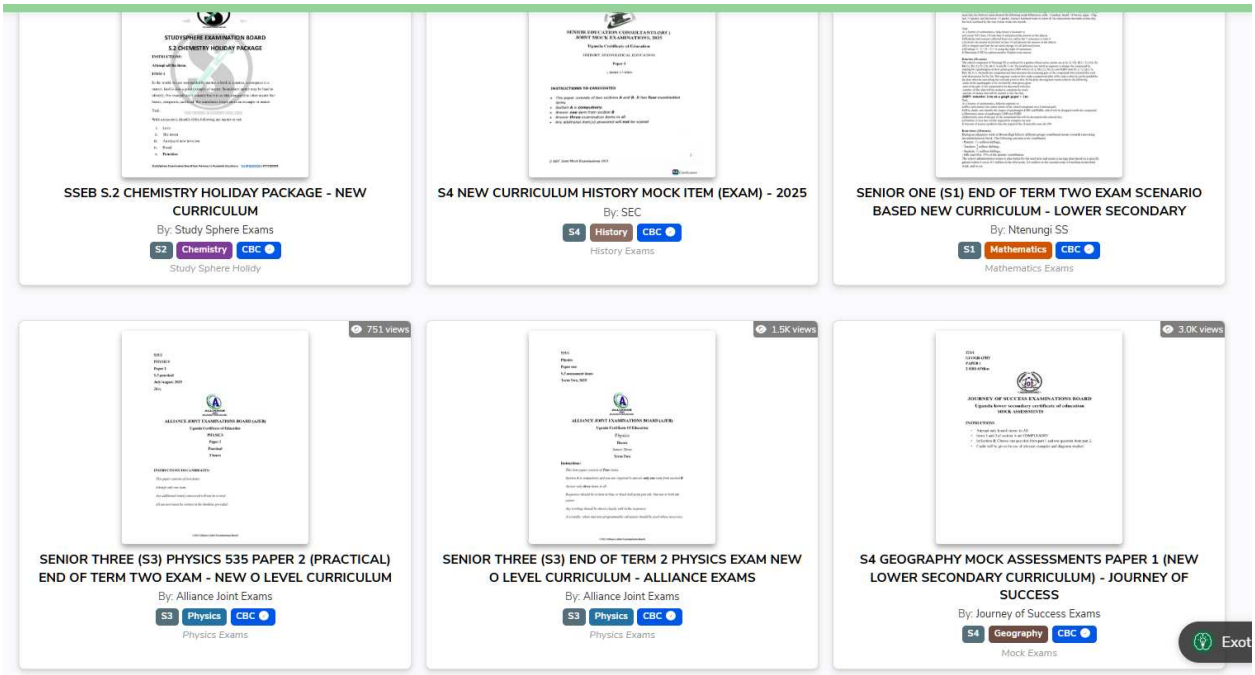
a) Design a systematic plan to identify the ions in the unknown solid.

Your plan should outline the procedures for the tests to be carried out, observations, deductions and include necessary safety precautions.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

END

This document was downloaded from https://exoticnotes.com



Do you need more papers for secondary?

Click
https://exoticnotes.com/papers/secondary

If you need papers for O level (S.1 – S.4)

Click
https://exoticnotes.com/papers/secondary/o-level

If you need papers for A level (S.5 – S.6)

Click
https://exoticnotes.com/papers/secondary/a-level