Candidate Name	Centre Number	Candidate Number
[illegible]	[illegible]	

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

CHEMISTRY 9189/5

PAPER 5 Practical Test

NOVEMBER 2012 SESSION 1 hour 20 minutes

Candidates answer on the question paper.
Additional materials:
As listed in Instructions to Supervisors

TIME 1 hour 20 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
You are advised to show all working in calculations.
Use of a Data Booklet is unnecessary.

FOR EXAMINER'S USE	
1	
2	
TOTAL	

This question paper consists of 6 printed pages and 2 blank pages.

For Examiner's Use

1 **FA1** is an impure sample of lead (IV) oxide, PbO_2.

FA2 is 0.5 mol dm^{-3} potassium iodide.

FA3 is 0.01 mol dm^{-3} sodium thiosulphate, $Na_2S_2O_3.5H_2O$.

You are required to determine the percentage purity of a sample of lead (IV) oxide using a titration method.

(a) Weigh an empty small beaker.

Place between 0.50 g and a 0.60 g of solid **FA1** in the small beaker and weigh again.

Record your weighings in **Table 1.1**.

Table 1.1

mass of small beaker + **FA1**/g	
mass of empty small beaker / g	
mass of **FA1** used /g	

[2]

Transfer all the contents of the small beaker into a 250 cm^3 volumetric flask.

Add 20 cm^3 of **FA2** followed by 50 cm^3 of 1 mol dm^{-3} sulphuric acid. Mix thoroughly by shaking until no further reaction is observed.

Add distilled water to the volumetric flask and make up to the mark with distilled water. Mix the contents by shaking and label this solution **FA4.**

(b) Pipette 25.0 cm^3 of **FA4** into a conical flask.

Titrate the contents of the conical flask with **FA3** until the colour of the solution is pale yellow.

Add about 3 to 5 drops of starch indicator to the conical flask and continue titrating until the blue colour disappears.

Repeat the titration as many times as you think necessary to obtain accurate results.

For Examiner's Use

Record your burette readings in **Table 1.2.**

Table 1.2: Titration of **FA4** with **FA3**

Final burette reading /cm^3				
Initial burette reading/cm^3				
Volume of **FA3** used /cm^3				

[15]

Summary

25 cm^3 of **FA4** reacted with _____ cm^3 of **FA3**.

Show which results you used to obtain this volume of **FA4** by placing a tick under the readings in **Table 1.2.**

In acidic solution, PbO_2 oxidises the iodide ions to iodine according to the equation:

$$PbO_{2(aq)} + 2I^-_{(aq)} + 4H^+_{(aq)} \rightarrow Pb^{2+}_{(aq)} + I_{2(aq)} + 2H_2O_{(l)}$$

$S_2O_3^{2-}$ ions and aqueous iodine react according to the following equations:

$$2S_2O_3^{2-}{}_{(aq)} \rightarrow S_4O_6^{2-}{}_{(aq)} + 2e^-$$

$$I_{2(aq)} + 2e^- \rightarrow 2I^-_{(aq)}$$

(c) Write a balanced equation for the reaction between thiosulphate ions and iodine.

_____ [1]

For Examiner's Use

(d) Calculate the number of moles of sodium thiosulphate in the volume of **FA3** quoted in your summary.

[1]

(e) Calculate the number of moles of iodine, in 25 cm^3 of **FA4.**

[1]

(f) Deduce the number of moles of lead (IV) oxide which produced the iodine in **(e).**

[1]

(g) Calculate the % purity of the sample of lead (IV) oxide.
[M_r : PbO_2 = 239.20]

[3]

(h) Explain why sulphuric acid was added in the preparation of **FA4.**

_____

_____

_____

[1]
[Total :25]

For Examiner's Use

Assessment of Planning Skills

Do not carry out your plan.

2 A school laboratory has run out of chemicals for carrying out 'A' level chemistry practicals. There are only three solutions left, namely

50 cm^3 4.5 $moldm^{-3}$ NaOH,

60 cm^3 3.5 $moldm^{-3}$ NaOH,

45 cm^3 2.5 $moldm^{-3}$ NaOH.

You are required to prepare 500 cm^3 of 1 $moldm^{-3}$ NaOH.

Using the solutions left, distilled water, a 50 cm^3 measuring cylinder and a 500 cm^3 volumetric flask and any other laboratory equipment of your choice, describe how you would prepare the 500 cm^3 of 1 $moldm^{-3}$ NaOH.

Present your plan as a sequence of numbered steps.

The plan

For Examiner's Use

[Total :15]