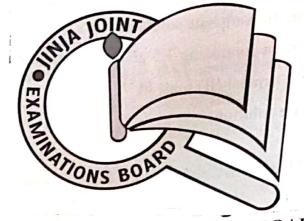
Candidate's name	
P525/3	IN JOINT
CHEMISTRY Paner 3	

P525/3 CHEMISTRY Paper 3 December 2020 31/4 Hours



# JINJA JOINT EXAMINATIONS BOARD

Uganda Advanced Certificate of Education MOCK EXAMINATIONS, 2020 CHEMISTRY

**PRACTICAL** 

Paper 3

3 hours 15 minutes

## INSTRUCTIONS TO CANDIDATES:

Answer all the questions.

Answers are to be written in the spaces provided.

Mathematical tables, slide rulers and non-programmable silent electronic calculators may be used.

Reference books (i.e textbooks, books on qualitative analysis, etc) should not be used.

Candidates are not allowed to start working with the apparatus for the first 15 minutes. This time is to ensure that they have all the chemicals and apparatus they need.

### For examiner's use only

Q.1	Q.2	Q.3	TOTAL
and the second s			147900
			and the second s

© 2020 Jinja Joint Examinations Board

## You are provided with the following:

DA1, which is sodium thiosulphate solution.

**DA2**, which is a solution containing 3.5 g $l^{-1}$  of potassium iodate (V).

Solid, R containing the metal (II) ions, M<sup>2+</sup>.

10% Potassium iodide solution.

2M Sulphuric acid.

2M Nitric acid.

You are required to standardize the solution of sodium thiosulphate in DA1 and then use it to determine the percentage of metal, M in solid R.

#### Theory

In acidic solution, potassium iodate (V) reacts with the potassium iodide according to the following equation;

$$IO_3^-(aq) + 6H^+(aq) + 5I^-(aq) \longrightarrow 3I_2(aq) + 3H_2O(1)$$

A solution of the metal (II) ions oxidises iodide ions to iodine according to the following equation;

$$2M^{2+}(aq) + 4l^{-}(aq) \longrightarrow M_2l_2(s) + l_2(aq)$$

The iodine liberated in both reactions can be titrated with thiosulphate solution according to the following equation;

$$I_2(aq) + 2S_2O_3^{2-}(aq) \longrightarrow S_4O_6^{2-}(aq) + 2I^-(aq)$$

Procedure:

Part I

- (a) Pipette 10cc<sup>3</sup> of **DA2** into a clean conical flask, and add an equal volume of 2 M sulphuric acid followed by 10 cm<sup>3</sup> of 10% potassium iodide solution.
- (b) Titrate the liberated iodine with **DA1** until the solution in the conical flask turns to pale yellow. Add 4-5 drops of starch indicator and continue with the titration until the blue-black complex is discharged.

W 12 12 12 12 12 12 12 12 12 12 12 12 12	
(c) Repeat the titration $2-3$ times to obtain cons	istent readings.
(d) Enter your results in the Table I below.	
D. Maria	
Results:  Volume of pipette used =	cm³ (0½ mark)
	(4½ marks
Table I	(7)2
Final burette reading (cm <sup>3</sup> )	
Initial burette reading (cm <sup>3</sup> )	The state of the s
Volume of DA1 used (cm <sup>3</sup> )	
	- Day Mary and Salar and a
Titre values used to calculate the average volume	
	cm <sup>3</sup> (0½ mark)
Average volume of DA1 used	
EA D 19702 C 1980	
Questions:	
(e) Calculate the;	
and the second s	25 cm <sup>3</sup> of DA2 (2½ marks)
(i) number of moles of iodate (V) ions in 2	25 cm 01 2.12. (271 mm.)
© 2020 Jinja Joint Examinations Board	Turn Over
THE RESERVE AND ADDRESS OF THE PARTY OF THE	

		7.0		
		10 W 10 L		
	***************************************			
<mark></mark>				
(ii) mo	olarity of the thiosulph	ate ions in DA1.		(03 marks)
Part II				
() Walah	accurately about 1.6 g	of R and transfer it	into a 250 cm <sup>3</sup>	beaker. Add
(a) Weigh	accurately about 1.0 g	y and worm cently for	or about 5 – 8 m	inutes until
$50 \text{ cm}^3$	of 2 M nitric acid to	it and warm gently it	or about 5	fleate and
R just o	dissolves. Transfer the	e contents into a 250	cm <sup>3</sup> volumetric	Hask and
then add	d distilled water to ma	ake up to the mark. L	abel the resulta	nt solution
DA3.				
(b) Pinette	10 cm <sup>3</sup> of DA3 into	a clean conical flask	followed by an	equal
volume of	f sodium carbonate so	olution and add 2-3 o	drops of ethanoi	c acid.
	d then add 10 cm <sup>3</sup> of			
mixture.	Titrate the mixture wi	th <b>DA1</b> until you ob	otain a cream w	nite colour.
(c) Repeat	the titration $2-3$ tin	nes until you obtain	consistent read	ngs.
(d) Enter v	our results in the tab	le II below		
(d) Enter y	our round in the wo			
	ga Tarah ayar sa			

Results			
Mass of empty container + R	es		g (0½ mark
Mass of empty container alo			
			g (0½ mark
Volume of pipette used =			cm³ (0½ mark
Table II			(4½ marks)
Final burette reading (cm³)			
Initial burette reading (cm <sup>3</sup> )			
Volume of DA1 used (cm <sup>3</sup> )			
Titre values used to calculate	average volum	ne of <b>DA1</b> used	cm³ (0½ mark
Average volume of DA1 used	L	***************************************	cm³ (2½ marks
Questions:			
(e) Calculate the; (i) number of moles	of metal (II) i	ons, <b>M<sup>2+</sup></b> in 25 o	cm <sup>3</sup> of <b>DA3</b> . (2½ marks
			Turn Over
© 2020 Jinja Joint Examina	tions Board	and the second	4 1111 0111

(ii) concentration in $gl^{-1}$ of the metal ions in DA3. (M = 60) (2½ mark)  (iii) percentage of metal M in solid R. (02 marks)		
(ii) concentration in $gl^{-1}$ of the metal ions in DA3. (M = 60) (2½ mark)  (iii) percentage of metal M in solid R. (02 marks)	***************************************	
(ii) concentration in $gl^{-1}$ of the metal ions in DA3. ( $M=60$ ) (2½ mark)  (iii) percentage of metal $M$ in solid $R$ . (02 marks)		
(ii) concentration in $gl^{-1}$ of the metal ions in DA3. ( $M=60$ ) (2½ mark)  (iii) percentage of metal $M$ in solid $R$ . (02 marks)		
(ii) concentration in $gl^{-1}$ of the metal ions in DA3. (M = 60) (2½ mark)  (iii) percentage of metal M in solid R. (02 marks)		
(ii) concentration in $gl^{-1}$ of the metal ions in DA3. (M = 60) (2½ mark)  (iii) percentage of metal M in solid R. (02 marks)		
(ii) concentration in $gl^{-1}$ of the metal ions in DA3. (M = 60) (2½ mark)  (iii) percentage of metal M in solid R. (02 marks)		
(ii) concentration in $gl^{-1}$ of the metal ions in DA3. ( $M=60$ ) (2.2 minus) (2.2 minus) (iii) percentage of metal M in solid R. (0.2 marks)		
(ii) concentration in $gl^{-1}$ of the metal ions in DA3. ( $M=60$ ) (2.2 minus) (2.2 minus) (iii) percentage of metal M in solid R. (0.2 marks)	***************************************	(21/ marks
(iii) percentage of metal M in solid R. (02 marks)	1-1 -fthom	petal ions in DA3. $(M = 60)$ (2% marks
(iii) percentage of metal M in solid R. (02 marks)	(ii) concentration in gl of the in	Ictal lone
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)	ve 1 1 1 1	
(iii) percentage of metal M in solid R. (02 marks)		•
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)	•••••	
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)	~ · · · · · · · · · · · · · · · · · · ·	
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal M in solid R. (02 marks)	21 12 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
(iii) percentage of metal M in solid R. (02 marks)	11.	
(iii) percentage of metal M in solid R. (02 marks)		
(iii) percentage of metal W III solid X.		
	(") margantage of metal M in solid	$\mathbf{R}$ . (02 marks)
	(iii) percentage of metal 2	
	The state of the s	
Accession to the contract of t	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
	an employed and the state of th	
© 2020 Jinja Joint Examinations Board Turn Over	© 2020 Jinja Joint Examinations Board	Turn Over

You are provided with the substance S which contains two cations and two anions. You are required to carry out the following tests on S to identify the cations and anions in it. Record your observations and deductions in the table below. Where a gas (es) is evolved, it must be identified.

(32 marks)

	TESTS	OBSER	EVATIONS	DEDUCTIO	INS
(a)	Heat one spatula end-ful of S	. ,			
	strongly in a dry test tube until there is no further				lyn
	change.				
				n	
			in the second	minis "" 4	. [1]
(b)	To one spatula end-ful of S			and the second of	
	in a test tube, add 2-3 drops	-		ar del E	
	of the concentrated sulphuric	*1		and:	
	acid and warm.			In New Age of	
				9H-121457	
(c)	To two snatula end-fuls of S			p = p = 20 = 2	7.5
ligg tell,	© 20	020 <mark>J</mark> inja Join	t Examinations Bo	pard Tur	n Over
	vigorously to dissolve.			Jun 10	
				h of all which	
		ons Board		Turn Over	

(d) To 1	cm <sup>3</sup> of the solution from	m	
line where t		The complete of the city of	, Inc.
The state of the s	dd 2 - 3 drops of the	, by a per spen, and a 7% of	All of the state o
LA VALLA LE	(III) chloride solution	translations and report to	
and h	eat to boiling.		
Park Carlo		PAPER.	
	2		
	cm <sup>3</sup> of the solution fron	n	
(c), ad	ld a few pieces of the		5 A
coppe	r turnings followed by		
4 –5 d	rops of concentrated		
sulphu	ric acid and heat.		
(f) To the	remaining solution		
from (c	e), add dilute sodium-		
hydrox	ide solution drop-wise	_ <u>1,1</u> 5.	
until in	excess. Shake and	40	1 1 1 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1
filter.		,	6 1
Keep b	oth the filtrate and		
residue		·	
		_	
To the fi	Iltrate in (f), add		
,,	tric acid drop-wise		
	solution is just	The state of the s	
	Solution is just		<i>(</i> )
acidic.			
	he acidified filtrate		
into thro	ee portions.		
the state of the s	and the control of th	THE WARRANT CONTRACT OF THE PROPERTY OF THE PR	

© 2020 Jinja Joint Examinations Board

	(i)	To the first portion of the	Mercent sergi sedena serget see tarrette selection and the	THE CONTROL OF THE CO
		acidified filtrate, add		4.
		dilute sodium hydroxide		The second
		solution drop-wise until		Control of the second
		in excess.		•
	(ii)	To the <b>second</b> portion of		
		the acidified filtrate, add		
		dilute ammonia solution		
		drop-wise until in excess.		
				10,000
	4115			
	(iii)	To the <b>third</b> portion of		
		the acidified filtrate, add		
		half a spatula end-ful of		<u>a</u>
		the solid ammonium		rd.
		chloride then followed by		1440
		4 –5 drops of Disodium		1
		hydrogen phosp- hate and		
		then ammonia drop-wise		4
		until in excess.		100
(h)		ash the residue from (f)	- 1	and the second
	an	d then dissolve it in dilute	1 20	
		ric acid.	The best of the second	10 200
	Di	vide the acidic solution	(a) (a) (b) (c) (d) (d)	91136 2 18 <sup>63</sup>
	int	o four parts.	- 1 (117 kg - 14 kg to 2	or or of Man

(i)	To the first part of the		
	acidic solution, add dilute		
	sodium hydroxide drop-		, ,
	wise until in excess.		
(ii)	To the second part of the		
	acidic solution, add dilute		
-	ammonia drop-wise until	• • •	
	in excess.		
	Leave the mixture to		
	stand.	7	
			1
(iii)	To the third part of the		
	acidic solution, add 3-4		
	drops of dilute sulphuric		
	acid.		
	1		
(iv)	Use the fourth part of the		
	acidic solution to carry		
	out a test of your own	- V	
	choice to confirm one of	Tana and	
	the cations in S. Record		
	your test and observations.		
	Test:		
the state of the s	and with respect to the control of places and the description of the second of the sec		

© 2020 Jinja Joint Examinations Board

		11		
		The state of the s	- **	
(i)	Identify the;			The late of the la
	(i) cations in S	and	a	
		and		
3.	You are provided with the sub- required to determine the natur	stance <b>H</b> which is an organic core of <b>H</b> . Carry out the following	ompound. You are	e
	your observations and deduction	ons in the table below.	(18 ma	
	TESTS	OBSERVATIONS	DEDUCTIO	ONS
(a)	Burn a small amount of <b>H</b> on a spatula end or in a  porcelain dish.			-i-
(b)	To 1 cm <sup>3</sup> of <b>H</b> in a test tube,			
(b)	add about 4 cm <sup>3</sup> of water and			
	shake. Test the solution with		7	
	litmus paper.			-
	Divide the solution into two		21, 1	1
	parts.		Andra stages	

© 2020 Jinja Joint Examinations Board

(i	) To the first part of the		
	solution, add 2 –3 drops		
	of neutral Iron (III)		
	chloride solution.	- 10 m	-
(i	i) To the <b>second</b> part of the	, d. 1	
	solution, add 2 –3 drops	.0	
	of acidified potassium-		
	dichromate (VI) solution	A-201 - 11 - 1	n kana yan ar I
,	and warm.		. Di . •••
	. 10	p	
(c)	To $2-3$ drops of H in a test	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	tube, add $4 - 5$ drops of the		
	2, 4-dinitrophenylhydrazine		
	solution.		
(d)	Dissolve 0.5 cm <sup>3</sup> of H in		
	about 1 cm <sup>3</sup> of methanol.	,	$T^{\pm}$
	To the solution, add 4 cm <sup>3</sup> of		
	iodine solution followed by	· · · · · · · · · · · · · · · · · · ·	, ,
	sodium hydroxide solution		
	drop-wise until the solution		lan .
	is pale yellow.		
	Heat the mixture and allow		* d)
CONTRACTOR CONTRACTOR	The state of the s		And the state of t

13			
	to stand.	Commission of the Commission o	arana area tiku mentendanaka silama sehiaranan alapan teken kentengan silamatan sebaga
(e)	To 1 cm <sup>3</sup> of <b>H</b> in a test tube,		ernet till storre skinne skunne ster åre storre til et storre skinne skinne skinne skinne skinne skinne skinne
	add an equal volume of the		
	Fehling's solution and heat		
	the mixture.		
(f)	To 3 cm <sup>3</sup> of the silver nitrate		
	solution, add 2 drops of		
	dilute sodium hydroxide		
-	solution. Then add ammonia		
	solution drop-wise until the		•
	precipitate formed just		_
	dissolves. Then add 5 cm3 of		
	H and warm.		
	Leave the mixture to stand.		
	(f) Comment on the nature of H.		
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
	,		