P525/3 Chemistry Paper 3 July - August 2019 3 1/4 hours



UGANDA MUSLIM TEACHERS' ASSOCIATION

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Centre/Index NoSignature	• • • •

UGANDA ADVANCED CERTIFICATE OF EDUCATION Chemistry Paper 3 3 hours 15 Minutes

INSTRUCTIONS TO CANDIDATES:

- This paper consists of three compulsory questions.
- All questions must be answered in the spaces provided.
- Mathematical tables (3 figure tables) and silent non-programmable scientific electronic calculators may be used.
- Candidates are advised to read through the paper and cross check with the apparatus and chemicals provided in the first fifteen minutes.

For Examiners' use only				
Q. 1	Q. 2	Q. 3	Total	
29	34	17	80	

You are provided with the following;

FA1 which is a solution containing 3.16gl-1 of potassium manganite (VII).

FA2, which is a solution of ammonium iron (II) sulphate -6 – water.

Solid T, which is impure potassium chlorate (V) (KClO₃) 2M sulphuric acid

You are required to;

- Standardize solution FA2 using FA1
- Determine the percentage purity of solid T.

Theory

In acidic medium, chlorate (V) ions react with iron (II) ions according to the following equation.

$$ClO_3^-(aq) + 6Fe^{2+}(aq) + 6H^+_{(aq)} \longrightarrow 6Fe^{3+}(aq) + Cl^-(aq) + 3H_2O(l)$$

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

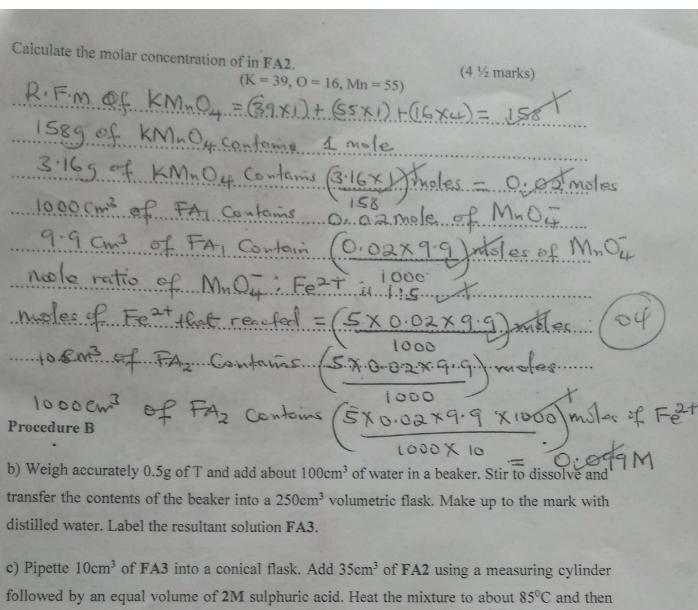
Procedure A:

a) Pipette 10cm³ of FA2 into a clean conical flask followed by an equal volume of 2M sulphuric acid and then titrate the mixture with FA1 from the burette until the end point. Repeat the titration until you obtain consistent readings. Enter your results in the table I below.

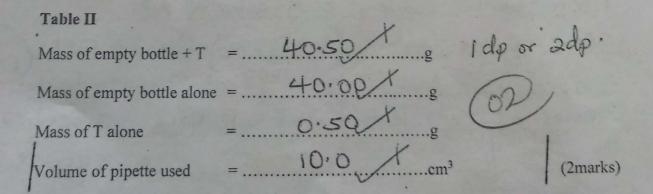
Table I

Volume of pipette used = 10.0 cm³ (½ marks)

Experiment	I	II	III	7
Final burette reading /cm ³	1000	2	1111	
Initial burette reading /cm ³	10,00	84.90	29.90	(0)
Volume of FA 1 used /cm ³	0000	15,00	20.00	(043)
· · · · · · · · · · · · · · · · · · ·	10.00	9.90	9:90	2dp(Aw
			(4½ marks)	Deny
Titre values used to calculate average	volume of FA1	(1	(½ marks)	
9.90 and 9.	90/	(3	/ (7 man, 15)	
Therefore Average volume of FA1 =	9.90+9	.90 = 91		525)
	2		(2 ½ marks)
		± 0.1.	1/8	
		±0.20	/,	
		士0.3		
Questions		I 0.4	/ 4	08
UMTA Joint Mocks 2019		+ 0.5	Page 2 of 8	100

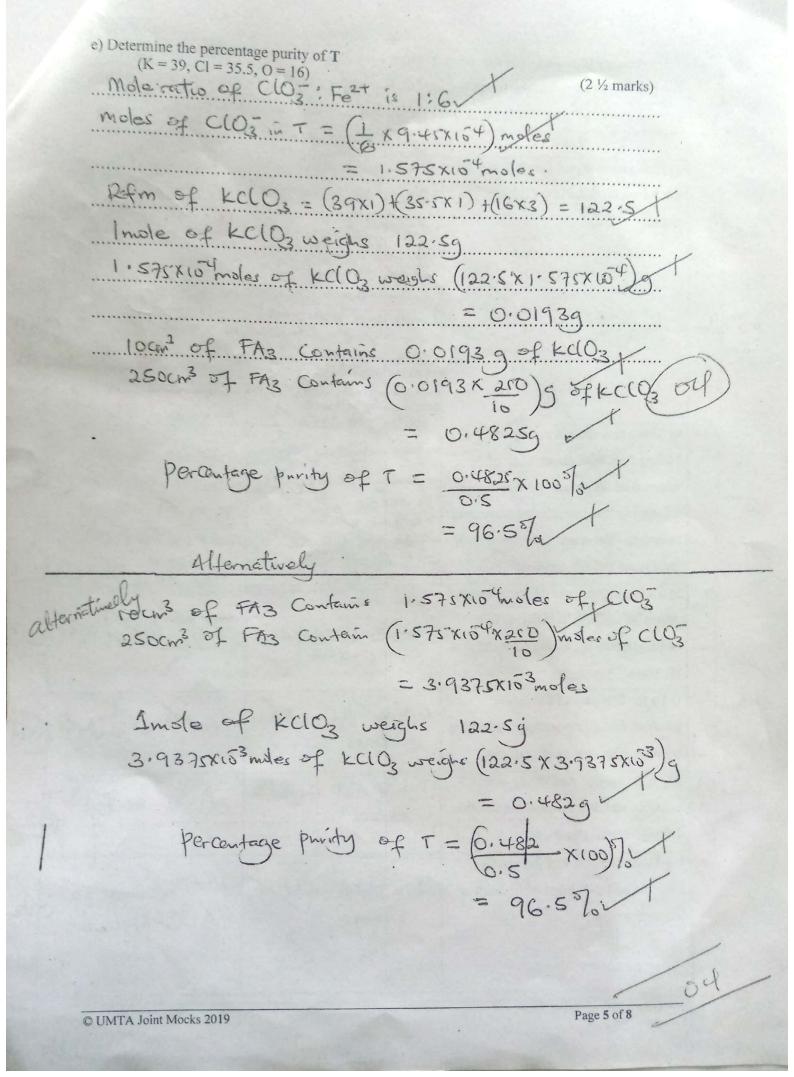


c) Pipette 10cm³ of FA3 into a conical flask. Add 35cm³ of FA2 using a measuring cylinder followed by an equal volume of 2M sulphuric acid. Heat the mixture to about 85°C and then cool in cold water for 3 minutes. Titrate the cold mixture with solution FA1 from the burette until the end point. Repeat the titration until you obtain consistent readings. Enter your results in table II below.



06___

Final burette reading /cm³ Initial burette reading /cm³ Volume of FA I used /cm³ Volume of FA I used /cm³ 25.20 25.20 25.20 Titre values used to calculate average volume of FAI used are 25.20 Cm³ (½ marks) Therefore average volume of FAI used = 25.20 th 25.20 cm³ (½ marks) Calculate the number of moles of; Excess iron (II) ions in FA2 that reacted with manganate (VII) ions. 1000cm³ of FAI Contains 0.02 males of M.O. Male ratio of M.O. Feat is 1000 Male ratio of M.O. Feat is 1000 Males of exacts Feat that reacted = (5 x 0.0 2x 15.2) males i) Iron (II) ions that reacted with 10cm³ of chlorate (V) ions in FA3. 1000cm³ of FA2 Contains 0.09 9 x 25 males of Feat 1000 = 3.465 x 103 moles Moles of Feat that reacted with Clos = 3 uses in moles Moles of Feat that reacted with Clos = 3 uses in moles Moles of Feat that reacted with Clos = 3 uses in moles Moles of Feat that reacted with Clos = 3 uses in moles	10		7	1	/
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Therefore average volume of FAI used = 25:20 t 25:20 cm ³ Questions = 25:20 cm ³ Analog in FAI contains on Damoles of Management of the Contains of Damoles of Management of Managemen	volume of FA I used /cm ³	25.20	25.20	25.34	
Therefore average volume of FAI used = 25:20 t 25:20 cm ³ Questions = 25:20 cm ³ Analog in FAI contains on Damoles of Management of the Contains of Damoles of Management of Managemen	Titre values used to calculate average	volume of FA1 us	ad ara		
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Moles of Fe2+ that reacted with Clos = 3,465/163-2.5. = 9.45×164 moles	35CH3 of FA2 Content	as (0.099x	35 moles	of 52+	(1)
Moles of Fe2+ that reacted with Clos = 3,465/163-2.5. = 9.45×164 moles		100	0		(0/2)
= 9.45×184molds			= 3,4	65X103mol	es
= 9.45×184molds	Moles of Fe2+ tha	to reacted w	with Clos	= 31465X	163-2.5
ATTA Injust Months 2010					
TA Joint Mocks 2019				- 145×10	imoles.
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2. You are provided with substance Y which contains three cations and one anion. You are required to carry out the following tests on Y to identify the cations and anion in it. Identify any gases evolved. Record your observations and deductions in the table below.

Tests	Observations	Deductions
a) Heat a spatula end-ful of Y in a dry	y-is authorite empstelline so	lied Non-transition metal is
test tube until there is no further	- Yellow / brown residen	
change.	-colombocaches turn moigh	1.0
	blue littines paper redal	19 803, 20to 202 b
	acidofred K2Cr2O7 from	
	orange to green	of the state of th
	- Colombes gas with check	NHz hence NHI pr
	I think blue and deglew	Nite S
	fumes with Hill	V
	- colowless tiguid turns	water of objetallisation
	anhydrous copper(11) fulphale	0, 55-65)
b) Shake two spatula end ful of Y in a	trous white to bide white sublimate	Ammonium falt.
boiling tube with about 3cm ³ of	- Brown / yellow solution	Fe3+
water. Add dilute sodium hydroxide	- Brown pot insolute	Fe ²⁺ (05
solution to the mixture dropwise until	in excess peridue	Fe3t/
n excess. Warm and filter keep both	- Colonless filtret	Zat Plator Alst
he filtrate and the residue.	- Colondace gate with charles	i will k
) To the filtrate, add dilute nitric acid	enell from most time from	NHZ hence NHE Confirm
ropwise until the solution is just	water Hall	-11.1
cidic. Divide the acidic solution into	White pipt soluble	Znat Plator Alst no
x parts.	in the acid	
To the first part of the acidic	White phi cutto	X X
lution, add dilute sodium hydroxide	1 PC Bracke	Zend Plate Arstr 100
lution dropwise until in excess.	in excecs	
To the second part of the acidic	White ppt insolute	
ution, add dilute ammonia solution		A (3) or & Pb2+
pp-wise until in excess.	in excess.	1 62
To the third part of the acidic		012+ 1
ution, add 2-3 drops of potassium	No observable t	Phatabsent so off
ide solution.	Change	Alst bresent Oltz
	0	

iv) To the fourth part of the acidic solution, add 2-3 drops of litmus solution followed by ammonia	Blue		
solution drop-wise until in excess.	Blue-lake Solution	A 13+ Confirmed	(15)
v) To the fifth part of the acidic solution, add 2-3 drops of lead (II) nitrate solution and heat. vi) Use the sixth part to carry out a	white bit insoluble	S034	12
test of your own choice to confirm the anion in Y. Barrum nitrate Solution is added	White ppt	SO 2- Konfirme	2 2 m
d) Wash the residue with water and dissolve it in dilute hydrochloric acid and divide the solution into three parts.	Brown/yellow Kolution	Fe3th	
i) To the first part of the acidic solution, add dilute sodium hydroxide solution drop-wise until in excess.	Brown ppt insolution	Fe3+1	(013)
ii) To the second part of the acidic solution, add dilute ammonia solution dropwise until in excess.	Brown Topt insoluble	Fe3+/	15
iii) To the third part of the acidic solution add 3-4 drops of potassium hiocyanate solution.	Blood-red solution	Fe3+ to-firmed	15
The cations in Y are NH4	AL3+ and Fe3+		
The anion in Y is	2-1	(o)/	124
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3. You are provided with an organic compound N. You are required to identify the nature of compound N. Carry out the following tests on the compound and record your observations and deductions in the table below.

Tests	Observations	Deductions	The last
a) Burn a spatula end- ful of Q on a porcelain dish or at the end of a spatula.	of burn with ablue/ yellow non-troty flame	saturated aliphate brain compound of ion catton	(DE)
 b) Shake 1cm³ of Q with about 2cm³ of water and test with litmus. 	Sis missible soluble	- Polar organic componed of low molecular mars 1-Azidet Componed probable of corporagic agid	(03)
c) To 0.5cm³ of Q add 2-3 drops of sodium carbonate solution.	No effervesconte	Carboxylic acid	(2)
d) To 0.5cm³ of Q, add 2-3 drops of acidified potassium dichromate solution and heat.	orange solution	Reducing effect probable printing alcohol second alcohol or aldehyde.	6-62
e) To 0.5cm ³ of Q, add 2-3 drops of Brady's reagent.	yellow par	Aldelyde present.	(el)
f) To about 1cm ³ of Q, add acidified potassium dichromate solution and heat. Then add ethanol followed by 4-5 drops of concentrated sulphuric acid. pour the mixture into a small beaker of cold water	orange columbian. turn to green. - sweet fruit	- Aldehyde toxidised (Reducing agent) - Ester formed so Aldehyde exides to carboxylicadd	622
g) To about 0.5cm ³ of Q, add about 4cm ³ of iodine solution followed by sodium hydroxide solution drop-wise until the brown colour of iodine is just discharged.	fellow pht	Q is Esthantal (Q is of the form CH36-H	(d)
n) To about 1cm ³ of Q, add about 5 drops of tollen reagent and heat gently.	silver mirror was formed.	Cf is extrained (aldelyde confirmed)	02

Comment on the nature of Q. Q is Efficience of Q.

alternaturated aliphatic aldelyde of the form CH2OTH

END

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