4.4.2 Practical Exercises on Iodimetry and Iod	ometryTitrations
4.4.2 Practical	
You are provided with the following:  17.4g of themetal thio  FA1 which is 0.06M iodine solution  FA2 which is a solution containing 17.4g of the metal in  FA2 which is a solution containing the molarity of the metal in  You are required to determine the molarity of the metal in  You are required to determine the molarity.	sulphate, XS <sub>2</sub> O <sub>3</sub> .5H <sub>2</sub> O in thiosulphate in FA2 and hence
Theory Aqueous iodine reacts with thiosulphate ions according to $I_2(aq) + 2S_2O_3^{2-}(aq) \rightarrow 2I(aq) + S_4O_6^{2-}(aq)$	
Procedure  i) Using a measuring cylinder, measure and transfer 100c make up to the mark with distilled water. Label the solution pripette 20 or 25cm³ of FA3 into a clean conical flask solution turns pale yellow. Add 1cm³ of starch solution just turns colourless. Repeat the titration until you obtain table below.  Capacity of pipette used	tion FA1 into a 250cm <sup>3</sup> volume to FA2 from the continue the titration in consistent results. Recommended to the continue
D: 1 hyrotte reading (cm <sup>3</sup> )	mo toppe of

Final burette reading (cm <sup>3</sup> )	no top par
Initial burette reading (cm <sup>3</sup> )	The state of the s
Volume of FA2used(cm <sup>3</sup> )	

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A Simplified App	roach to A' Level Chemistry Practicals
ues used to calculate average	
nes used to calculate a 17	100 cm <sup>3</sup>
volume of the	cm
alculate the molarity of iodine in FA3.	ma
alculate the molarity of jodine in FA3.  1000 Can 1000 CAn Cartan 0.06	Vin ) 0 1
100 Cm? Of FAT. Contain (0000)	100 MG = 0.006Mdes.
2 2 2 A. FAZ. Contain. O. OD	6 mg
1000cm of FAz Contain 0.000 250cm of FAz Contain 0.000 250cm of FAz Contain 0.000 250cm of FAz Contain 0.000 1000cm of FAz Contain 0.000	x 250 mly = 0.06 mly
250 cm	25.0
250 cm3 of FA3 Contan 0, 86	my 0.24M
1000 cm? of fats contain souls	× 1000 M = 0.2711
	487
Determine the:	
number of moles of thiosulphate ions	in FA2 that reacted with the iodine in FA3.
i) number of moles of thiosalphae to 1000 (1000m) of FAz Contain 0.24	t noty
	10 11
ii) molarity of the thiosulphate ions in Fa	A2 and hence the value of X in XS <sub>2</sub> O <sub>3</sub> .5H <sub>2</sub> O.
(S=32, O=16, H=1)	
	· Comment of the comm
And the second of the second of the second	
and the same of th	

Exp	eri	me	nt	4.4	2.2
You	are	pro	Vi	ded	WILL
TAT	h	des	ic	noti	ISSIU

the following: m manganate(VII) solution

FA2 which is sodium thiosulphate solution

FA3 which is 10% potassium iodide solution

FA4 which is 2.0M sulphuric acid

FA4 which is 2.0M sulphured to determine the molar concentration of FA2 and then use it to determine the You are required to determine the molar concentration of FA1.

Theory
Dichromate(VI) ions and manganate(VII) ions in an acidic medium, react with iodide  $ion_{Sacconding}$ Dichromate(VI) ions and manganate(VII) ions in an acidic medium, react with iodide  $ion_{Sacconding}$ g equations.  $Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6I(aq) \rightarrow 2Cr_3^{3+}(aq) + 7H_2O(1) + 3I_2(aq)$ 

 $2MnO_{3}(aq) + 16H^{+}(aq) + 6I(aq) \rightarrow 2Mn^{2+}(aq) + 8H_{2}O(l) + 5I_{2}(aq)$ 

Aqueous iodine reacts with thiosulphate ions according to the following equation.

 $I_2(aq) + 2S_2O_3^2(aq) \rightarrow 2\Gamma(aq) + S_4O_6^2(aq)$ 

Procedure I

Weigh accurately 1.4g of solid M into a clean beaker. Measureand transfer about  $60 \text{cm}^3$  of FA4 into a 250cm<sup>3</sup> vol. Weigh accurately 1.4g of solid M into a clean beaker. Transfer the solution into a 250cm<sup>3</sup> volume beaker containing solid M and stir well to dissolve. Transfer the solution FA5.

flaskand make up to the mark with distilled water. Laber the solution flaskand make up to the mark with distilled water. Laber the solution flask followed by 15cm<sup>3</sup> of FA3 followed by 15cm<sup>3</sup> of FA4. The pipette 20 or 25cm<sup>3</sup> of FA5 into a conical flask. Add 15cm<sup>3</sup> of FA4. The solution turns pale yellow. Add 1cm<sup>3</sup> of FA4. The solution turns pale yellow. Pipette 20 or 25cm³ of FA5 into a conical mask. Add 15cm³ of FA4 Tipe the resultant mixture with FA2 from the burette until the solution turns pale yellow. Add 1cm³ of State the resultant mixture with FA2 from the burette until the solution turns from dark blue to a pale blue solution. the resultant mixture with FA2 from the burette until the solution and continue the titration until the solution turns from dark blue to a pale blue solution. Rep

Mass of container + M	g
Mass of container alone	g
Mass of solid M	g
Capacity of pipette used	cm <sup>3</sup>

## Table I

Final burette reading (cm <sup>3</sup> )	
Initial burette reading (cm <sup>3</sup> )	
Volume of FA2 used(cm <sup>3</sup> )	

Values used to calculate average	
00	~ Cm'

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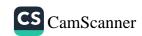
Your Guide to the

leulate the:	n the 20 or 25cm <sup>3</sup> of FA5 pipetted.
2019 X FAT Cont	(29x2)+(52x2)+(16x7)= 39+104+112=2924
1.49 of FA Contain	(1x 1-4) m/s = 0-00 47 62
	294
ii) molar concentration of FA2	
	······································
cedure II	
20 of 75cm of FAT Into a conical	al flask. Add 15cm <sup>3</sup> of FA3 followed by 15cm <sup>3</sup> of FA4.
1 - Intion and continue the titration	from the burette until the solution turns pale yellow. Add 1 cm <sup>3</sup> of a until the end point is reached. Repeat the titration until you
ain consistent results. Record your res	suits in table II below.
Table II	fifthe = 25,0 cm²
Final burette reading (cm <sup>3</sup> )	the facility is at the arm it is much that the second of t
Initial burette reading (cm <sup>3</sup> )	
Volume of FA2 used(cm <sup>3</sup> )	
alues used to calculate average	
verage volume of 1	cm <sup>3</sup>
Determine the molar concentration of	FAI.
Dolomina	

prouch to A Level Chemistry Pro
oproach to A' Level Chemistry Practicals
of potassium chromate in 200cm <sup>3</sup> of solution.
g 25.0g of a hydrated metal thiosulphate, MS.
of potassium chromate in 200cm <sup>3</sup> of solution. g 25.0g of a hydrated metal thiosulphate, MS <sub>2O<sub>3</sub>,XH<sub>2O<sub>1</sub></sub>,</sub>
KIO <sub>3</sub> .
phate in HA2 and the percentage of water of crystallization date used in the preparation of HA1.
y water of crystalli.
date used in the preparation of HA1.
ed to dichromate ions according to the following equation: $Cr_2O_7^{2-}(aq) + H_2O(aq)$
$\rightarrow Cr_2O_7^{-2}(aq) + H_2O(aq)$
$\rightarrow Cr_2O_7$ (aq) + $H_2O(aq)$ eact with iodide ions according to the equations below: $I(aq) \rightarrow 3I_2(aq) + 3H_2O(l)$
$(aq) \rightarrow 2Cr^{3+}(aq) + 7H_2O(l) + 3I_2(aq)$
And an an an area of the second secon
conical flask. Add 30cm <sup>3</sup> of the 2M sulphuric acid followed ution and titrate with HA2 from the burette until a
ution and titrate with HA2 from the burette until the solution and indicator and continue the titration until the solution indicator and continue the titration indicator and continue t
starch indicator and continue the titration until the solution Repeat the titration until you obtain consistent and ark
Repeat the titration until you obtain consistent results. Re
pette used

11	A Simplified Approach to A' Level Chemistry Practicals
	The same and the s
lution . Me	estions Calculate the number of moles of CrO <sub>4</sub> <sup>2-</sup> ions in the 20 or 25cm <sup>3</sup> of HA1 pipetted.
30	The state of the s
	ine the:
24	Determine the: i) molarity of the S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> ions in HA2.
er of com	1) 110
0.	
owinge	
ttions belong	
	ii) value of x in MS <sub>2</sub> O <sub>3</sub> .xH <sub>2</sub> O.(M=46, S=32, O=16, H=1)
te acid	
until	
stent resul	
13	iii) percentage by mass of water of crystallisation in the hydrated metal thiosulphate, MS <sub>2</sub> O <sub>3</sub> .xH <sub>2</sub> O.
1	
	The state of the s
	PART II  Procedure  i) Weigh accurately, 1.0g of solid T into a clean beaker. Add about 150cm <sup>3</sup> of water and stir well to dissolve. Transfer the solution to a 250cm <sup>3</sup> volumetric flask and make up to the mark with distilled water.
	dissolve. Transfer the solution to a 25 Label the solution HA5.  Label the solution HA5.  Li)Using a measuring cylinder, measure and transfer 25cm³ of HA5 into a clean conical flask and add ii)Using a measuring cylinder, measure and transfer 25cm³ of the 2M sulphuric acid and then titrate 10cm³ of the 10% potassium iodide solution followed by 10cm³ of the 2M sulphuric acid and then titrate 10cm³ of the 10% potassium iodide solution followed by 10cm³ of the 2M sulphuric acid and 1cm³ of starch the liberated Iodine with HA2 from the burette until the solution is pale yellow; then add 1cm³ of starch
go 110	Your Guide to the Most Recent Explorations in Chemistry Page 119
ge 118	Your Guide to the Most Recent Experience

dicator and continue the titration u	ed Approach to A' Level Contil the solution just turns	coloni
A Simplification and continue the titration unbtain consistent results. Record your  Mass of contain	results in table II below.	colourless. Repeat the tie
Mass of conta	iner + T	
Mass of conta	iner alone	gg
Mass of solid		gg
Table II	hett= 25.0	gg
Final burette reading (cm <sup>3</sup> )	100	
Initial burette reading (cm <sup>3</sup> )		
Volume of HA2 used(cm <sup>3</sup> )		
/alues used to calculate average		
Average volume of HA2 used	6-80 cm3	
Questions		
c) Determine the:		
i) number of moles of IO <sub>3</sub> ions in	the 250cm <sup>3</sup> of HA5.	
***************************************		
***************************************		
ii)mass of pure potassium iodate potassium iodate sample used in	in the 250cm <sup>3</sup> of HA5and he	ence the percentage
potassium iodate sample used in	the preparation of HA5.(K=3	39, I=127, O=16)
***************************************		
	The second of the second	



i) potassium dichromate(VI) in FA	l.			
Determine the molar concentration	of:			
verage volume of FA3 used		3. 00 On		cm <sup>3</sup>
alues used to calculate average	······································	3.00 cm3		cm <sup>3</sup>
Volume				
Volume of FA3 used(cm <sup>3</sup> )				
Initial burette reading (cm <sup>3</sup> )				
Final burette reading (cm <sup>2</sup> )				
Table I				
Capacity of pi	pette used2	5-0	cm <sup>3</sup>	
urns pale yellow, male blue.			oldon S	
5M sulphune 11 1 am of starch	g cylinder and titi indicator and con	rate with FA3 frontinue the titration	om the burette until the	starch-
procedure I pipette 20 or 25cm <sup>3</sup> of FA1 into a cle	an conical flask.	Add an equal vol	lume of FA4 followed	by 30cm <sup>3</sup> of
$Cr_2O_7^{2-}(aq) + 14H^{+}(aq) + 6H^{+}(aq) + 2\Gamma(aq) + 2H^{+}(aq) + 2\Gamma(aq)$	$I_2(aq)+2H_2C$	0(1)	2(-1)	
n acidic medium, n acidic medium, quations below. $Cr_2O_7^2$ (aq) + 14H <sup>+</sup> (aq) + 61 $Cr_2O_7^2$ (aq) + 2H <sup>+</sup> (aq) + 2 $\Gamma$ (ac)	$(ag) \rightarrow 2Cr^{3+}(ag)$	(1) + 7H2O(1) + 31	J <sub>2</sub> (aq)	- Walnet
rheory n acidic medium, dichromate(VI) io	ns and hydrogen p	peroxide react w	ith iodide ions as show	n by the
tholume				
5M sulphuric acid to determine the: ou are required to determine the: ou are required to determine the: ou are required to determine the: to are strength of the hydrogen processes the strength of the hydrogen processes.	peroxide solution	in FA2.		
		litre in FA3.		
A3 which is 10% potassian				
Juich iso at a tagginm lodide	water			
Al which ishydrogen peroduction ishydrogen pe				
ou archich contains no peroxide solu		in 500cm' of so	lution.	
xperiment 4.4.2.4  xperiment 4.4.2.4  ou are provided with the following ou are provided out in 1.8g of potassium at which ishydrogen peroxide solution at the provided is sodium thiosulphate-5-  which issodium thiosulphate-5-  which issodium thiosulphate-5-		in 500cm <sup>3</sup> of so	lution.	

A Simplij	fied Approach to A Level Chemistry Pract	ticals
ii) sodium thiosulphate in FA3.		
ii) sodium thiosulphate		
Manage Committee		
	DES PORTE DE SERVICIONES	
		***************************************
	100cm <sup>3</sup> of FA3 into a clean	heat-
Procedure II	re and transfer 100cm <sup>3</sup> of FA3 into a clean and label the solution FA5.	beaker. Add 10000
Procedure II  Using a measuring cylinder, measuring a measuring cylinder, measuring is a measuring are all to mix are all the mix are al	nd label the solution 172	u, of
istilled water, show	Jean conical flask. Add an equal volume of	FA4 followed
pipette 20 or 25cm <sup>3</sup> of FA2 into a c	clean conical flask. Add an equal volume of asuring cylinder. Leave the mixture to settle you shake the conical flask and its content	for 12 minutes 200
of 1.5M Sulphuric acid using a state of 1.5M Sul	suring cylinder. Leave the many suring cylinder. Leave the conical flask and its content of the cylinder of th	ion until the
itrate with PAS home	of starch indicator and	the blue-black
solution turns pale yellow, additional turns colour turns colour	7 0 CO	
Capaci	ty of pipette used. 28 co	cm <sup>3</sup>
	The state of the s	
Table II  Final burette reading (cm <sup>3</sup> )		
Final butette reaching (cm <sup>3</sup> )		
Initial burette reading (cm <sup>3</sup> )		
Volume of FA5 used(cm <sup>3</sup> )		
The same of the sa	A 0	TOTAL STREET,
Values used to calculate average	31,30	
Average volume of FA5 used	Jacob Car	
o) Calculate the:	TATE OF	
i) molar concentration of sodiu	m thiosulphate in FA5.	
		•••••
The state of the s	The second secon	COMPANY OF STREET
Your Guide to the Most	Recent Explorations in Chemistry	Page 122
	A STATE OF THE PARTY OF THE PAR	

## A Simplified Approach to A' Level Chemistry Practicals ii) molar concentarion of hydrogen peroxide in the FA2 solution. and or a sale a comment iii)volume strength of hydrogen peroxide in the FA2 solution. (NB: Volume strength is the volume of oxygen gas liberated by 1cm3 of hydrogen peroxide solution; 1 mole of a gas occupies 24dm3 at room temperature) Experiment 4.4.2.5 You are provided with the following: FA1 which contains 19.84g of sodium thiosulphate-5-water in one litre of solution. FA2 which is 10% potassium iodide solution FA3 which is 2M sulphuric acid Solution Bwhich is Jik solution [a solution of a bleaching agent that contains hypochlorite/chloric(I) ions] You are required to determine the: i) concentration of sodium thiosulphate in FA1in moldm<sup>-3</sup>. ii) percentage by mass of aqueous chlorine in solution B. Solutions of bleaching agents such as Jik are prepared by bubbling chlorine gas through a cold dilute solution of sodium hydroxide. Sodium chloride, sodium hypochlorite and water are formed according to the following equation. $Cl_2(g) + 2NaOH(aq) \rightarrow NaCl(aq) + NaOCl(aq) + H_2O(l)$ Addition of a dilute acid to a solution of such a bleaching agent liberates aqueous chlorine according to the equation below. $Cl(aq) + OCl(aq) + 2H^{+}(aq) \rightarrow Cl_{2}(aq) + H_{2}O(l)$ Since chlorine is more reactive than iodine, the aqueous chlorine has the ability to displace iodide ions from the salt potassium iodide, forming aqueous iodine as shown below. $Cl_2(aq) + 2\Gamma(aq) \rightarrow 2C\Gamma + I_2(aq)$ Page 123 Your Guide to the Most Recent Explorations in Chemistry

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A Simplified Approach to A		Practical

The aqueous iodine formed can thus be titrated against standard sodium thiosulphate solution below.

Lance with the equation below.  $2\Gamma(aq) + S_4O_6^{2-}(aq)$ 

Procedure
Using a suitable measuring cylinder, measure 20cm<sup>3</sup> of solution B into a 250cm<sup>3</sup> volumetric flow to the mark with distilled water. Label the resultant solution FA4.

Using a season with district make up to the mark with the Using a measuring cylinder, measure and transfer 25cm of FA2. Titratethe liberated flask Using a measuring cylinder, add about 10cm<sup>3</sup> of FA3 followed by 10cm<sup>3</sup> of FA2. Titratethe liberated in measuring cylinder, add about 10cm<sup>3</sup> of FA3 followed by 10cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the burette until the solution turns pale yellow; add 1cm<sup>3</sup> of starch indicator and the buret Using a measuring cylinder, add about 10cm<sup>3</sup> of FA3 followed by real and 1cm<sup>3</sup> of starch indicator and complex just turns colourless. Repeat the titration was in the table below. FA1 from the burette until the solution turns pare years, the solution turns colourless. Repeat the titration until the blue-black starch-iodine complex just turns colourless. Repeat the titration until the blue-black starch-iodine complex just turns colourless. Repeat the titration until the table below.

Final burette reading (cm <sup>3</sup> )	
Initial burette reading (cm <sup>3</sup> )	
Volume of FA1 used(cm <sup>3</sup> )	

a)	Determine the concentration of sodium thiosulphate in FA1 in moldm <sup>-3</sup> .
	(Na=23, S=32, O=16, H=1)

b) Calculate the:

i) number of moles of aqueous iodine liberated by 25cm<sup>3</sup> of FA4.

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************		
of aqueous ch	nlorine in the 20cm <sup>3</sup> of solution B.(Cl=35.5)	
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		ee.
	11 ' · · · 1 · · D · · · · 3	
ncentration of	aqueous chlorine in solution B in gdm <sup>-3</sup> .	
		**
		-
ercentage by ma	ass of aqueous chlorine in solution B. (Density of solution B=1gcm <sup>-3</sup> )	
		4



A Simplified Appro	all the second s
A Simply	
Experiment 4.4.2.6 You are provided with the following: GA1 which is 10% potassium iodide solution. GA2 which contains 8.68gof sodium thiosulph GA3 which contains 8.68gof sodium thiosulph GA3 which contains 8.68gof sodium thiosulph GA4 which contains 8.68gof sodium thiosulph GA5 which contains 8.68gof sodium thiosulph GA6 which contains 8.68gof sodium thiosulph GA7 which contains 8.68gof sodium thiosulph GA7 which contains 8.68gof sodium thiosulph GA8 which contains 8.68gof sodium thiosulph GA8 which contains 8.68gof sodium thiosulph GA8 which contains 8.68gof sodium thiosulph	nate in 500cm <sup>3</sup> of solution.
GA1 which contains 8.68ges GA2 which contains 8.68ges GA2 which contains 8.68ges GA1 which is bleaching powder (CaOCl <sub>2</sub> ). Golid M which is bleaching powder the: GA1. GA1. GA1. GA1. GA1. GA1. GA1. GA1.	
2M sulphuric actions bleaching powers of available chlorine the: Solid M which is bleaching powers the: You are required to determine the: You are required to determine the in GA1.	to bleaching powder sample.
you are vy of sodium in a grailable chiloring	
ii) percentage by in	Go volume of water and the mixture stirred
a special in a spe	ecific volume of water and the mixture stirred to make
Theory The bleaching owder can be dissolved and the bleaching owder can be dis	acoustion, aqueous chlorine is liberal
dilute solution hyperation hypera	ochiorite solding
On addition of a dilute acid to the calcium hypochlorite, $CaOCl_2$ according to the calcium hypochlorite, $CaOCl_2$ according to $CaOCl_2$ according to the calcium hypochlorite, $CaOCl_2(aq) + 2H^+(aq) \rightarrow Ca^{2+}$	$(aq) + Cl_2(aq) + H_2O(l)$
calcium hypotherical calcium h	a aqueous chioime has the same and sprace lodida.
in a is more reactive	n below.
Since chlorine is more representations as shown from its salt, forming aqueous iodine as shown from the salt is salt, forming a shown from the salt is salt in the salt in the salt is salt in the salt in t	$r_{-}+I_{2}(aq)$ ed against standard sodium thiosulphate solution in $S_{2}(aq) + S_{4}O_{6}^{2}-(aq)$
The aqueous iodine formed can the according to the equation below. $I_2(aq) + 2S_2O_3^2(aq) \rightarrow 2I$	(aq) + 5400 + 5
Pipette 25.0 or 20.0cm <sup>3</sup> of GA3 into a conical	ker. Add 100cm <sup>3</sup> of water and transfer the resultant solution GA3.  I flask. Using a measuring cylinder, add 10cm <sup>3</sup> of 2M titrate the liberated iodine with GA2 from the burette tarch indicator and continue the titration until the blue Repeat the titration until you obtain consistent results.
the in the table DEIOW.	
Capacity of pipette us	ed25 (O
Final burette reading (cm <sup>3</sup> )	
Initial burette reading (cm <sup>3</sup> )	
Volume of GA2 used(cm <sup>3</sup> )	
volume of G/12 used(om)	
Values would be calculate growned	3
Average volume of GA2 used	180an
Average volume of GAZ used	
No. 2:	
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Come to the Most Recent Ex	cplorations in Chemistry Page 126
	•

A Simplified Approach to A' Level Che	emistry Practicals
alculate the molarity of sodium thiosulphate in GA2. (Na=23, S=32, O=16, H=1)	
(Na=23, S=32, O=16, H=1)	
	the state of the s
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,	***************************************
,	
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	***************************************
Calculate the:	
i) number of moles of aqueous iodine liberated by 25.0 or 20	.0cm <sup>3</sup> of GA3.
	***************************************
	A service and white and born the
	***************************************
ii) mass ofchlorine in the 250cm <sup>3</sup> of GA3.(Cl=35.5)	
	***************************************
	•••••••••••••••••••
The second secon	
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	A Simplified
	y mass of available chlorine in solid M.
	y mass of available chlorine in solid ivi.
h	y mass of available
iii) percentage of	The state of the s
111) 1	***
	***************************************
	**************************************
	***************************************
Experiment 4.4.2. You are provided with FA1 which is sodium FA2 which is a solution is a solution.	ith the following: in thiosulphate solution. in thiosulphate solution. ition containing 20.5g of a hydrated copper(II) salt, CuY.nH <sub>2</sub> O per litre. ition containing 20.5g of a hydrated copper(II) salt, CuY.nH <sub>2</sub> O per litre. ition containing 20.5g of a hydrated copper(II) salt, CuY.nH <sub>2</sub> O per litre. ition containing 20.5g of a hydrated copper(II) salt, CuY.nH <sub>2</sub> O per litre.
You are required to i) concentration of	determine the solution of the determine the solution of the s
ii) value of h in out hydrated copper(II)	) salt.
nyuruce	according to the following equation.
Copper(II) ions rea	todate ions react with iodide ions according to the following equation. $I(q) + 5I(aq) + 6H^{+}(aq) \rightarrow H_{2}O(l) + 3I_{2}(aq)$ and aqueous Iodine as show at with iodide ions to form both copper(I) iodide and aqueous Iodine as show at $I(qq)$ .
equation below. $2Cu^{2+}$	$I(aq) + 4I(aq) \rightarrow Cu_2I_2(s) + I_2(aq)$ the can then be titrated with sodium thiosulphate as shown by the equation below $1 + 2S_2O_3^{2-}(aq) \rightarrow 2I(aq) + S_4O_6^{2-}(aq)$
and i Company	ly, 1.0g of solid U into a clean beaker. Using a measuring cylinder, add about d stir well to dissolve. Transfer into a 250cm <sup>3</sup> volumetric flask and make up to water. Label the solution FA5.
April 10 10 100	Mass of container + Ug
	Mass of container aloneg
	Mass of solid Ug
of FA4 followed by	5cm <sup>3</sup> of FA5 into a clean conical flask. Using a measuring cylinder, add about v 10cm <sup>3</sup> of FA3.
(iii) Titrate the libe	erated Iodine with FA1 from the burette until the solution turns pale yellow; and continue the titration until the blue-black starch-iodine complex just turns
	ation until you obtain consistent results. Record your results in the table below.

A Simplified Approach to A' Level Chemistry Pr.	
Capacity of pipette used. 25'0	acticals
capacity of pipette used25.0	
Final burette reading (cm³)	cm'
Final burette reading (cm³) Initial burette reading (cm³)	The state of the s
mitial burette (cm³)	The same of the sa
Initial burette reads (cm³) Volume of FA1 used(cm³)	
Von	
used to calculate average31.300n3	
tues used to calculate average	cm
erage volume of 1	
to concentration of potassium jodeta is a	cm
Determine the concentration of potassium iodate in FA5 in moldm <sup>-3</sup> . (K=	39 /= 127 0
De-	57, 1-127, 0=16)
	***************************************
	************
	***************************************
testion of the sodium this transfer	
Calculate the concentration of the sodium thiosulphate in FA1in mol dm <sup>-3</sup>	
rocedure II	
pipette 20 of 25 of the pipette 20 of 25 of 25 of the pipette 20 of 25 o	cylinder, add about 10cm <sup>3</sup>
Titrate the liberated Iodine with FA1 from the burette until the solution turn of starch indicator and continue the titration until the blue-black starch-iod	ms pale yellow; add 1cm <sup>3</sup>
20101111055.	
ii)Repeat the titration until you obtain consistent results. Record your results	in the table below.
Capacity of pipette used	
orphoto asca	cm <sup>3</sup>
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Simplified Approach 20.00
A Simplified Approach to A' Level Chemistry Practicals
Final burette reading (cm <sup>3</sup> )
Final burette reading (cm <sup>3</sup> )  Initial burette reading (cm <sup>3</sup> )
Initial burette read(cm <sup>3</sup> )
Volume of FA1 used(cm <sup>3</sup> )
Contraction of the contraction o
Values used to calculate average25
Average volume of FA1 used
Average voices
e) Calculate the: i) number of moles of copper(II)ions in FA2 which reacted with the iodide ions in FA3.
c) Calculate the: i) number of moles of copper(II)ions in FA2 which red
1) Human
ii) concentration of copper(II) ions in FA2 in mol dm <sup>-3</sup> .
ii) concentration of copper(*)
d) Determine the value of n in CuY.nH <sub>2</sub> O and hence the percentage by mass, of water of crystallization in
the hydrated copper(II) salt. (Cu=64, Y=96, H=1, O=16)
the hydrated copper(in) sum (
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Experiment 4.4.2.8  Experi	ains 5.58g of hydrated	d sodium thiosulphate, N	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> .5H <sub>2</sub> O in 250cm <sup>3</sup>
150 Lich is 1:de solution.			
of solution. of solution is potassium mangana of solution is potassium iodide solution. GA2 which is potassium iodide solution. 10% potassium iodide solution. 10% potassium iodide solution.			
2M sulphuric is impure iron(11) o	e:		
Solid required of the potassium	n manganate(VII) so	lution in mol dm-3	
2M Sulf which is the Solid Z which is the solid in the Solid Z which is	1) oxalate sample.	· · ·	
(i) percentus			
to(VII) ions rea	ct with thiosulphate i	ione iron(In :	
Theory Acidified manganate(VII) ions rea the following equations. the following equations.		ons, non(11) ions and o	xalate ions according to
Actual Ac	2		and to
the $I$	$r^2$ $(aq) \rightarrow 2Mn^{2+}(aq)$	$(q) + 8H_2O(1) + 5S_2O_2^2 -$	(an)
the following t	$(aq) \rightarrow Mn^{2+}(aq) + 4H$	$I_2O(1) + 5E_0^{3+}$	(aq)
$MnO_4^{-}(aq) + 8H^{-}(aq) + 5C_2O_4$ $2MnO_4^{-}(aq) + 16H^{+}(aq) + 5C_2O_4$	$^{2-}(aa) \rightarrow 2Mn^{2+}(-$	sre (aq)	
$(aq) + 16H(aq) + 3C_2O_4$	(aq) 21vin (aq	$(l) + 8H_2O(l) + 10CO_2(g)$	3)
2Mn0+			
15cm <sup>3</sup> of 10% potassidading o	ised28	Jour Jour	results in table I below
Table I conding (cm <sup>3</sup> )			
Final burette reading (cm)			
Initial burette reading (cm <sup>3</sup> )			
Volume of GA1 used(cm <sup>3</sup> )			
Volume of GAT acceptance			
Titre values used to calculate verage	ge		cm <sup>3</sup>
Average volume of GA1 used			cm <sup>3</sup>
Procedure B	l 1 11110	3 000	
Weigh accurately 1.5g of Z into a cluster is solve. Transfer the resultant solutions are supported by the control of the contr	tion into a 250cm <sup>3</sup>	Ocm of 2.0M sulphuric	acid and stir well to
ddition of more distilled water. La	bel the solution GAS	3.	ike up to the mark by
ddition of more distilled water. La	bel the solution GAS	3.	ke up to the mark by

	nified Approach
	or 20cm³) of GA3 into a conical flask and heat the solution to 70°C. Titrate the last and point is reached. Repeat the titration until you go as Record your results in table II below.
	oom3) of GA3 into a cond point is reaction until the interest of the life in the interest of t
Poorte 25cm3 (	or 20cm³) of GA3 into the end point is a second until you have a from the burette until the end point is a second your results in table II below.  Mass of beaker + Z
alution with G	Record your results
onsistent result	to and the Country of
	Minor tear and the control of the co
	Mass of beakerg
	Mass of Z
	Mass of beaker  Mass of Z
. **	
Table II	tte reading (cm <sup>3</sup> )
Final bure	anding (cm <sup>3</sup> )
Initial bure	ette reading (cm <sup>3</sup> )
Volume o	f GA2 used(cm <sup>3</sup> )
	1
Titre values us	sed to calculate verage
-1	ne of GAZ used
Average	he: GA2. (Na=39, S=32, O=16)
(a) Calculate t (i) molarit	the: y of potassium manganate(VII) in GA2. (Na=39, S=32, O=16)
***************************************	
***************	
***************************************	
(ii) moles	of manganate(VII) ions that reacted with 25cm <sup>3</sup> (or 20cm <sup>3</sup> ) of GA3.
***************************************	
***************************************	
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(iii) moles of iron(II) ions in 25cm <sup>3</sup> (or 20cm <sup>3</sup> ) of GA3.
moles of iron(II) items
***************************************
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**************************************
***************************************
***************************************
(b) Determine the: (i) Determine the: (i) mass of iron(II) oxalate, FeC <sub>2</sub> O <sub>4</sub> in 250cm <sup>3</sup> of GA3. (Fe = 56, C=12, O=16)
(b) Death (1) Oxaliance, 1 0 2 0 1 1 1 1 1 2 1 2 1 2 1 2 1 2 1 2
Silva inna(II) avaleta comple
(ii) percentage purity of the iron(II) oxalate sample.
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