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C C	HEMISTRY	
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Saturday 12th August 2023 (Morning) 2 hours 45 minutes

ACHOLI SECONDARY SCHOOLS EXAMINATIONS COMMITTEE

Uganda Advanced Certificate of Education Joint Mock Examinations, 2023 CHEMISTRY

Paper 1

2 hours 45 minutes

INSTRUCTIONS TO CANDIDATES:

- Answer all questions in section A and six questions in section B.
- All questions must be answered in the spaces provided.
- The Periodic Table, with relative atomic masses, is supplied.
- Mathematical tables (3-figure table) are adequate or non-programmable scientific electronic calculators may be used.
- Illustrate your answers with equations where applicable.

Where necessary, use the following:

Molar gas constant, R

 $= 8.31 \ JK^{-1} mol^{-1}$.

Molar volume of gas at s.t.p is 22.4 litres.

Standard temperature

= 273 K

Standard pressure

 $= 101325 \text{ Nm}^{-2}$

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
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SECTION A (46 marks)

Answer all questions in this section.

1. The standard electrode potentials for some redox systems are shown	below.
V.C., 21.43717	$E^0 = +1.46V$
Para C	$E^0 = +1.23V$
TANK OF THE PARTY	0 11 0 11
(a) Write the:	
(i) Cathode half-cell equation of reaction.	(01 mark)
370 672 7 17 F.W	
(ii) Overall equation for the reaction.	(1½ marks)
21 1, 21 1, 22 2, 21 1, 22 2	
(b) (i) Calculate the energy generated by the cell	(2½ marks)
	-, -, -,
(ii) State whether the cell reaction in (a) is feasible or not.	(½ mark)
2. Complete the following equations and in each case name the main org	anic product.
(a) (CH₃)₂CH₂Br Dry ether	(1½ marks)
Name of product	
(b) $CH_2CH=CH_2 + HBr(g) \xrightarrow{CH_3OOCH_3}$	
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to italiano	lame of produc	NH NHCONH	
(c)	CH₃CHO —	NH ₂ NHCONH ₂	(116 marks)
edielije V	lame of product	t terras no assertiativo anali	(1½ marks)
	1411 14131		
		oH ·	
014 (6.4)		C ₂ H ₅ OH/H ⁺	
(d)		heat	(1½ marks
N	ame of product		
3. (a) Expla	in		
(i) what is mear	nt by the term complex ion?	(01 mark)
(i	i) two factors t	that can favour formation of complexes.	(1½ marks)
(i	i) two factors t	that can favour formation of complexes.	(1½ marks)
(i	i) two factors t	that can favour formation of complexes.	(1½ marks)
	VSiac	that can favour formation of complexes. e below by providing the name of each of	
	VSiac		following complexes (02 marks)
(b) Co	implete the table	e below by providing the name of each of	following complexes (02 marks)

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whom skill)	assium chromium(III) sulphate	(0)
(i)	State what was observed.	
	HCCC A	7
(ii)	Write equation for the reaction that took place.	(01 mark)
4. (a)(i) Briefl	y describe how a sample of soap can be prepared.	(2½ marks)
(Promiska)	is against the control of the state of the s	
(ii)	Write equation leading to the formation of soap.	(01 mark)
real -		
	in why small holes are formed on terylene shirts when pon of soap	placed in concentrat (1½ marks)
	Total and the	
(ii) Sta	ate one advantage of soap as compared to soapless de	etergents.
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ti	xcess. On	gaseous hydroca cooling to room gases were pas	temperature	, the residua	gases occup	ied 155 cm	3. When
(2)	i) Calcu	ulate the molecu	lar formula o	f. Q.	jeo nosifii e nbe byo othe	Sa or 20 %)3 marks)
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/	and the second	and the telline					
(t	aque	rms a red precipi ous ammonia. W	/rite		·	,	
	(i)	the structural	iormula and	TOPAC name	or Q.	((01 mark)
		equation for the aqueous amm	onia.			(01	mark)
7. Ph		V) chloride deco				ng to the fo	llowing
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and the second	$PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g);$	
` '	an expression for the equilibrium constant, Kc.	(0½ mark)
(b) When 350°Ca of chlo	1 mole of phosphorus (V) chloride was placed in a 1 and at a certain pressure, the equilibrium mixture was rine.	as found to contain 38.4%
	culate the equilibrium constant, K_c .	(03 marks)
	ov stotis bac	Whichair (b)
		(enarcesst)
•		
	and the second s	
		107 100
(ii) The	equilibrium constant for the above reaction at 250°C	was found to be 1.54.
Stat	e whether the reaction is exothermic or endothermic.	Give a reason for your
ansv	ver.	(01 mark)
(c) State w	what would happen to the concentration of chloring	of the pressure in the
vessel v your ans	vas decreased while temperature is maintained at 3 swer.	(1½ marks)
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gifts	.i' ,i'nuki ca saunti .cga e ti 10	
	11 200	
compounds.)	agent that can be used to distinguish being agent that can be used to distinguish being agent case, state what would be observed with the reagent you have named a	red if each member of the pairs i
	HO and CH₃CH₂CHO	(03 marks)
Reagent(s)		
Observation(s	5)	

Equation of re	eaction(c)	
Equation of re	eaction(s)	
		(03 marks)
(b) (CH ₃); Reagent(s)	₂CHNH₂ and (CH₃)₂NH	
(b) (CH ₃)	₂CHNH₂ and (CH₃)₂NH	
(b) (CH ₃); Reagent(s)	₂CHNH₂ and (CH₃)₂NH	
(b) (CH ₃); Reagent(s) Observation(₂CHNH₂ and (CH₃)₂NH	(03 marks)
(b) (CH ₃); Reagent(s) Observation(₂ CHNH ₂ and (CH ₃) ₂ NH s)	(03 marks)
(b) (CH ₃); Reagent(s) Observation(₂CHNH₂ and (CH₃)₂NH s)	(03 marks)
(b) (CH ₃); Reagent(s) Observation(₂CHNH₂ and (CH₃)₂NH s)	(03 marks)
(b) (CH ₃); Reagent(s) Observation(cCHNH₂ and (CH₃)₂NH s) eaction(s)	(03 marks)
(b) (CH ₃): Reagent(s) Observation(cCHNH₂ and (CH₃)₂NH s) eaction(s)	(03 marks)
(b) (CH ₃) Reagent(s) Observation(eaction(s)	(03 marks)

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TZ marks	ous stunding pewaración gam pente	d al sback	mullipa Mouris
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SO ₃ ²⁻	200 10 200 1000 1000 1000	1 2 1 3	
	1 2 2 2		
,			
(b) Explain	Why nitrite ion adopts the named shape	in (a)	(41)
(b) Explain	why nitrite ion adopts the named shape	in (a)	(1½ m
(b) Explain	why nitrite ion adopts the named shape	in (a)	(1½ m
(b) Explain	why nitrite ion adopts the named shape	in (a)	(1½ m
			VII. 20, 03
(c) State w	why nitrite ion adopts the named shape hat would be observed when sodium sulp m manganate (VII) solution		VII. 20, 03
(c) State w	hat would be observed when sodium sulc	ohite solution	is added to acid (02 marks
(c) State w potassiu	hat would be observed when sodium sulp m manganate (VII) solution	ohite solution	is added to acid (02 marks
(c) State w potassiu	hat would be observed when sodium sulp m manganate (VII) solution	ohite solution	is added to acid (02 marks
(c) State w potassiu	hat would be observed when sodium sulp m manganate (VII) solution	ohite solution	is added to acid (02 marks
(c) State w potassiu	hat would be observed when sodium sulp m manganate (VII) solution	ohite solution	is added to acid (02 marks

Answer six questions from this section	
would be observed and write equation for the reaction	n that would take
	(02 marks)
um iodide is heated with concentrated sulphuric acid.	(UZ Marks)
ition	100
1	
n	
oic acid is boiled with Fehling's solution.	(02 marks)
ation	
and the fact of the contract o	Language Co. April 601
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was added to acidified potassium dichromate (VI) solut	ion. (2½ marks)
Widom string the most of the second	
. 100	
	•••••••••••••••••••••••••••••••••••••••
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	would be observed and write equation for the reaction ium iodide is heated with concentrated sulphuric acid. In oic acid is boiled with Fehling's solution. ation was added to acidified potassium dichromate (VI) solution. Atholi Secondary Schools Examinations Committee

(d) Potassium	chlorate (V) solution is added to acidified solution of iron (21/2 marks)	(II) sulphate.
Observatio	on	
ter a li li e del contra di	the second secon	
\.		
	Para ting and to dase to sensy in a column of sep endiv	(7.10)
Equation		
11. Carbon, silic	on, germanium and tin are some of the elements of group IV	of the
Periodic Tab		
(a) Write the	general outermost electronic configuration of the elements.	(0½ mark)
(b) State the	e trend in the metallic nature and explain your answer. (1½ marks)
Le 10e L		
	•	
(b) State two		
	ons why carbon shows differences in its properties from the resents in the same group.	t of the (01 mark)
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	perties in which carbon differs from the other elements.	
	motteves	eri0
	1301144	(02 marks)
(ii) Desc	ribe how each of the hydrides in (d) (i) react with water.	(02 marks)
12. Write equa	tions to show how the following conversions can be carried out. xanone from benzene and propene.	(,
		. 21
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(b) HC	≡ CH	to C ₆ H ₅ CH ₂ Cl	(03 marks)
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		The second of the second by the second by	
		# 1 Mag 10 4.14	
		Anna Caracteria de Caracteria	
(c) Eth	nanol to 2-hy	droxypropanoic acid.	(03 marks)
	······		
		-400, 1221, 1	The state of the s
			Literation I
13. (a) W	rite the elect	cronic configuration of manganese (II) ions and	
	••••••	30 400 40 10 10 30 30 40 10	
•••••	••••••		131.17 (11.
		ganate (VII) is commonly employed in volume e first standardized.	tric analysis. However, it
(i)	State two	disadvantages of using potassium manganat	e (VII) in volumetric
	analysis.		(02 marks)
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	Define the term common ion effect.	(01 mar
		ATTENDED FOR
	on stake o e sirt newy or alare hydroxida svoulti charge है है। eather t है सम्बन्धा के प्रकार के प्रसार कर्म कर eathballe shot "suu	
(b) Z	Zinc hydroxide is sparingly soluble In water. Write the expression to broduct, Ksp, for zinc hydroxide.	for the solul (0½ ma
	5.0 g of zinc hydroxide was shaken in 1 dm ³ of water and the mixture. 24.0 cm ³ of the filtrate required 5.6 cm ³ of a 0.1 M hydrochloric complete reaction using phenolphthalein indicator. Calculate the	ure filtered a
(i) solubility product constant, K_{sp} of zinc hydroxide at 25°C.	(2½ mar
	endinados republicantes en estaciones de la constanción de la constanción de la constanción de la constanción de	service
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		······································
) percentage of zinc hydroxide that dissolved at 25°C	(02 marks
•••••		
••••••		
••••••		•••••
		••••••

Calento 100	to the transmitted of effect.	
	plain how the solubility of zinc hydroxide would change if its sat	urated solution a (1½ marks)
17.0	C is separately treated with zinc sulphate solution.	
(sham zk b)	Damby Pinch C	

	v solubility product, Ksp is used in prediction of precipitation.	
	to Reduct Prairie and the first	
La Trans.	Section of the sectio	
	mechanism to show how each of the following conversions can Benzene to phenylethanone.	be effected. (03 marks)
(b) B	enzoic acid to 3-nitrobenzoic acid.	(03 marks)
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(a) the decoder and the second of the second	
(c) Hydroxbenzene to phenyl ethyl ether.	(03 marks)
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g	
	•••••••••••••••••••••••••••••••••••••••
16. (a) State:	
(i) Raoult's law.	(01 mark)
(3)	
geren i geringen gen habbet i vita	
(ii) Three properties of an ideal solution.	(1½ marks)
• •	
(b) A solution of A and B with a vapour pressure of	f 11.999kPa is such that the
male fraction of A is 0.25 at 25°C. Showing yo	our reasoning, state whether
the percentage is ideal and determine the percentage	e composition of the vapour.
(The vapour pressure of pure A and pure B at 25	°C are 8.000 kPa and 13.332
kPa respectively.)	(03 marks)
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	20 - 20 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	
(a) (i) Ck	etch a labelled boiling point-composition diagram fo	or the mixture in
	above.	(2½ marks)
(5)		
	ste's lang.	US 2 12
(ii) Sta	ate what would be obtained as the distillate and the resi	due if a liquid mixture (01 mark)
în ((b) containing 40% A is fractionally distilled.	(OI mark)
••••		
	PPROTEIN COMMENTS OF THE PROPERTY OF THE PROPE	
	nerse Manget her mineral of the standing	

7 "2/		Y at the Microbia con the	178. 2
		The states in the least.	
17. (a) ((i) Write the formula a	and the name of one ore from	which zing can be
	extracted.	and the fiding of one of thom	(01 mark)
	EIC (F)		
(11)		nich can be used to concentrate	the ore you have name
	a(i).		(0½ mark)
		in (a)(i) was converted to zinc o	oxide. (0½ mar
(1)	State how the conver	rsion was carried out.	(072 11181
(ii	i) Write the equation fo	or the reaction to illustrate your	answer in b(i). (01 mark
			· · · · · · · · · · · · · · · · · · ·
	he zinc oxide in (b) wa n air in a blast furnace.	s mixed with limestone and cok	e and the mixture heated
111		pose of adding limestone.	(1½ mark)
•••••••••••		for the reaction leading to the f	

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	<u></u>	and and arms? -1	abo XX
SULL MENT	in the stabilities of the Allen and t	, r grasia	
(i) Write equation for the reaction tha	et took place.	(1½ mar

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