ICSE 2024 EXAMINATION

CHEMISTRY

SAMPLE PAPER - 10

Time allowed: Two hours Max. Merks: 80 Answers to this Paper must be written on the paper provided separately. You will not be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper. The time given at the head of this Paper is the time allowed for writing the answers. Section A is compulsory. Attempt any four questions from Section B. The intended marks for questions or parts of questions are given in brackets []. SECTION A (Attempt all questions from this Section.) Question 1 : Choose one correct answer to the questions from the given options : [15] (i) A particular solution contains molecules and ions of the solute so it is a : (a) weak acid (b) strong acid (c) strong base (d) salt solution. (ii) A compound which liberates reddish brown gas around the anode during electrolysis in its molten state is: (a) Sodium chloride (b) Copper(II) oxide (c) Copper(II) sulphate (d) Lead(II) bromide (iii) An organic compound undergoes addition reactions and gives a red colour precipitate with ammoniacal cuprous chloride. Therefore, the organic compound could be : (a) Ethane (b) Ethene (c) Ethyne (d) Ethanol (iv) An organic weak acid is ; (a) Formic acid (b) Sulphuric acid (e) Nitric scid (d) Hydrochloric scid (v) During ionization metals lose electrons, this change can be called : (a) Oxidation (b) Reduction (c) Redox (d) Displacement (vi) Which one of the following is not true of metals: (b) Metals are malleable and ductile (a) Metals are good conductors of electricity (c) Metals from non-polar covalent compounds (d) Metal will have 1 or 2 or 3 electrons in their valence shell (vii) An example of a complex salt is : (a) Zinc sulphate (b) Sodium hydrogensulphate (c) Iron(II) ammonium sulphate (d) Tetrammine copper(II) sulphate. (viii) Aqua regis is a mixture of : (a) Dilute hydrochloric acid and concentrated nitric acid. (b) Concentrated hydrochloric acid and dilute nitric acid. (c) Concentrated hydrochloric acid [1 part] and concentrated nitric acid [3 parts] (d) Concentrated hydrochloric acid [3 parts] and concentrated nitric acid [1 part] (ix) The organic compound mixed with ethanol to make it spurious is :

(c) Methanal

(c) 5

(d) Ethanoic acid

(d) 7

(b) Methanoic acid

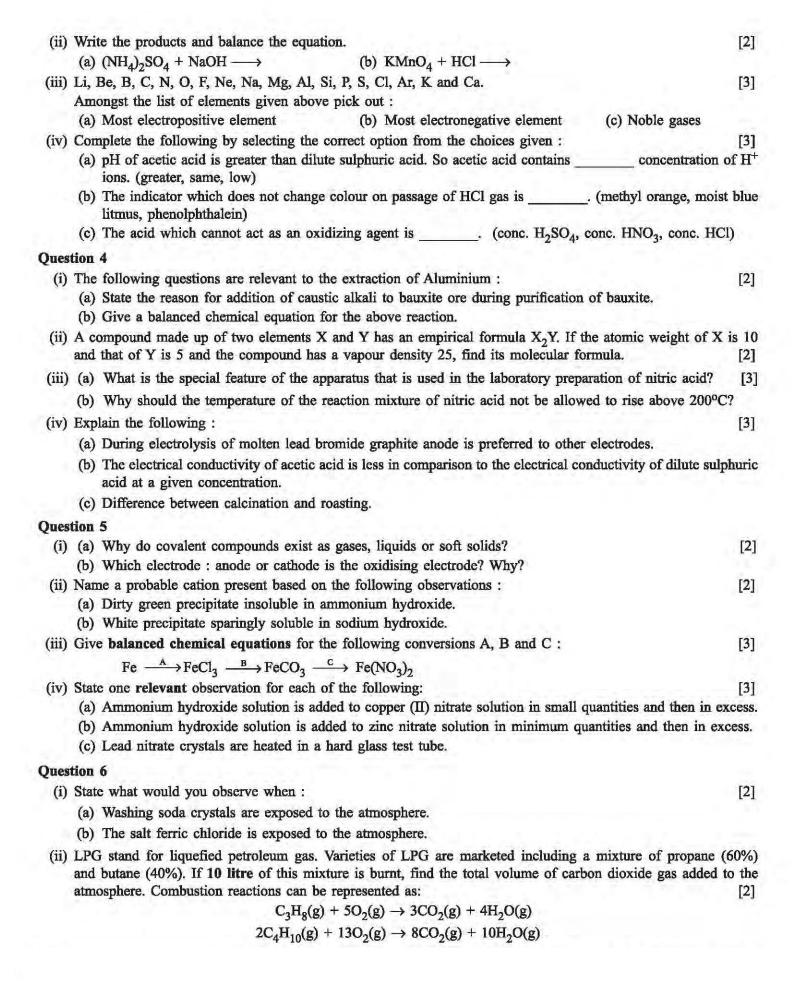
(x) The number of electrons present in the valence shell of a halogen is :

(6) 3

(a) Methanol

(a) 1

Onest	(c) Heating copper oxi	ide.	(d)	Passing oxyge	n over heated copper oxide?	
n e		ide.	(a)	rassing oxyge	n over neated copper oxide?	
Quest						- 25
(i)	The questions below ar	e related to the manu			3 3 3 3 3	[5]
	(a) Name the process.		, ,		nust the reactants be taken?	50.65.25.46
	(c) Name the catalyst				ion for the manufacture of an	mmonia.
	(e) Ammonia can act				or such a reaction.	
(ii)	Match the alloys given	in column A to the u	ises given in	column B:		[5]
		Column A		Column	В	
	(a) Durah	umin	1. Electr	ical fuse		
	(b) Solde	r	2. Surgio	cal instruments	1	
	(c) Brass		3. Aircra	ift body		
	(d) Stainl	ess Steel	4. Decor	ative articles		
(iii)	(e) Bronz	by choosing the cor	rect answers			[5]
(iv)	Complete the following (a) Metals are good	by choosing the cor- (oxidizing acceptors / donors). counds have the of a solution, the rescaled of the country of the	rect answers ing agents / i (high more precipitate i cample of fumes with i (H = 1; C = i corms a solut reacting with	from the bracker reducing agents) / low) melting p (acidic as soluble in exc (hyd) NH ₃ . = 12) ion after someting p	because they are electron points. Talkaline) it is. ess NH ₄ OH. ration / hydrogenation).	[5]
(iv)	Complete the following (a) Metals are good	by choosing the cor- (oxidizing acceptors / donors). counds have the of a solution, the respect to ethane is an extended acceptor of the country of	rect answers ing agents / i (high more precipitate i cample of fumes with i (H = 1; C = i corms a solut reacting with	from the bracker reducing agents) / low) melting p (acidic as soluble in exc (hyd) NH ₃ . = 12) ion after someting p	because they are electron points. Talkaline) it is. ess NH ₄ OH. ration / hydrogenation).	
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(iv)	Complete the following (a) Metals are good	by choosing the correction (oxidizing acceptors / donors). Sounds have the of a solution, the result of the correction o	rect answers ing agents / i (high more precipitate i cample of fumes with (H = 1; C = forms a solut eacting with molecular f	from the bracker reducing agents) / low) melting properties and agents of the second control of the second co	because they are electron points. Talkaline) it is. ess NH ₄ OH. ration / hydrogenation).	[5]
(iv) :	Complete the following (a) Metals are good (b) Electrovalent comp (c) Higher the pH value (d) (Ag (e) Conversion of ethe Identify the following: (a) An acidic gas which (b) An alkane whose re (c) A solid which whee (d) An alloy used in ee (e) A metal which give Draw different isomers (a) C ₅ H ₁₂ (chain)	by choosing the correction (oxidizing acceptors / donors). Sounds have the of a solution, the result of the correction o	rect answers ing agents / i (high more precipitate is tample of fumes with i (H = 1; C = i forms a solution	from the bracker reducing agents) / low) melting properties and agents of the second control of the second co	because they are electron points. Talkaline) it is. ess NH ₄ OH. ration / hydrogenation).	[5]
(iv) (v)	Complete the following (a) Metals are good (b) Electrovalent comp (c) Higher the pH value (d) (Ag (e) Conversion of ethe Identify the following: (a) An acidic gas which (b) An alkane whose re (c) A solid which whee (d) An alloy used in ee (e) A metal which give Draw different isomers (a) C ₅ H ₁₂ (chain)	by choosing the correction (oxidizing acceptors / donors). Sounds have the of a solution, the result of the correction o	rect answers ing agents / i (high more precipitate i ample of fumes with (H = 1; C = forms a solut reacting with molecular f Section apt any four	from the bracker reducing agents) / low) melting reducing agents / low) melting reducide acidic ac	because they are electron points. Talkaline) it is. ess NH ₄ OH. ration / hydrogenation).	[5]
(iv)	Complete the following (a) Metals are good (b) Electrovalent comp (c) Higher the pH value (d)	by choosing the cor- (oxidizing acceptors / donors). counds have the of a solution, the rescription of the control o	rect answers ing agents / i (high more precipitate i ample of fumes with (H = 1; C = forms a solut reacting with molecular f Section apt any four	from the bracker reducing agents) / low) melting reducing agents / low) melting reducide acidic ac	because they are electron points. Talkaline) it is. ess NH ₄ OH. ration / hydrogenation).	[5]



(iii) Some properties of sulphuric acid are listed below. Choose the property A, B, C, or D which is respective reactions (a) to (c).	onsible for [3]
A: Acid B: Dehydrating agent C: Non-volatile acid D: Oxidizing agent	[2]
(a) $S + 2H_2SO_4 \longrightarrow 3SO_2 + 2H_2O$ (b) $NaCl + H_2SO_4 \longrightarrow NaHSO_4 + HCl$	
(c) $CuO + H_2SO_4 \longrightarrow CuSO_4 + H_2O$	
(iv) Identify the acid which matches the following description (a) to (c):	[3]
(a) The acid which produces sugar charcoal from sugar.	[5]
(b) The acid which is prepared by catalytic oxidation of ammonia.	
(c) The acid on mixing with lead nitrate solution produces a white precipitate which is insoluble even of	on heating.
Question 7	
(i) A gaseous hydrocarbon of vapour density 29, contains 82.76% of carbon. Calculate its empirical fo	rmula and
molecular formula. $[C = 12, H = 1]$	[2]
(ii) Name the functional group present in	[2]
(a) CH ₃ COCH ₃ (b) CH ₃ CHO	
(iii) A metal article is to be electroplated with silver. The electrolyte selected is sodium argentocyanide.	[3]
(a) State one condition to ensure that the deposit is smooth, firm and long lasting.	
(b) Write the reaction taking place at the cathode.	
(c) Write the reaction taking place at the anode.	F0.7
(iv) (a) Give two examples of weak acids.	[3]
(b) Give two examples of bases which are not soluble in water.(c) The pH of a solution is 5. To this solution is added a liquid when the pH decreases to 3. What is liquid added to the solution?	nature of
Question 8	
(i) Give the electron dot structure of the following:	[2]
(a) NH_3 (b) H_3O^+	977
(ii) Answer the following questions:	[2]
(a) How will you distinguish between Ammonium hydroxide and Sodium hydroxide using coppe solution?	r sulphate
(b) How will you distinguish between dilute hydrochloric acid and dilute sulphuric acid using le solution?	ad nitrate
(iii) Name the particles present in:	[3]
(a) Strong electrolyte (b) Non-electrolyte (c) Weak electrolyte	-2.4
(iv) The metals of Group 2 from top to bottom are Be, Mg, Ca, Sr, and Ba.	[3]
(a) Which one of these elements will form ions most readily and why?	
(b) State the common feature in the electronic configuration of all these elements.	
A A A	

SOLUTION

Time allowed: Two hours

Max. Marks: 80

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The time given at the head of this Paper is the time allowed for writing the answers.

Section A is compulsory. Attempt any four questions from Section B.

The intended marks for questions or parts of questions are given in brackets [].

	SECTION A (Attempt all questions from this Section.)							
	(Ittempt wit questions from this section.)							
Ques	stion 1 : Choose one corr	rect answer to the question	ons fro	om the given options	•	[15]		
(i)	A particular solution con	tains molecules and ions of	of the s	colute so it is a :				
	(a) weak acid	(b) strong acid	(c)	strong base	(d)	salt solution.		
(ii)	A compound which liber	ates reddish brown gas arc	ound th	ne anode during electro	olysis i	in its molten state is:		
	(a) Sodium chloride	(b) Copper(II) oxide	(c)	Copper(II) sulphate	(d)	Lead(II) bromide		
(iii)		ndergoes addition reactions organic compound could be	_	ives a red colour prec	ipitate	with ammoniacal cuprous		
	(a) Ethane	(b) Ethene	(c)	Ethyne	(d)	Ethanol		
(iv)	An organic weak acid is	:						
	(a) Formic acid	(b) Sulphuric acid	(c)	Nitric acid	(d)	Hydrochloric acid		
(v)	During ionization metals	lose electrons, this change	e can b	e called:				
	(a) Oxidation	(b) Reduction	(c)	Redox	(d)	Displacement		
(vi)	Which one of the follow	ing is not true of metals:						
	(a) Metals are good con	ductors of electricity	(b)	Metals are malleable	and d	uctile		
	(c) Metals from non-pol	lar covalent compounds						
	(d) Metal will have 1 or	r 2 or 3 electrons in their	valence	e shell				
(vii)	An example of a comple	x salt is:						
	(a) Zinc sulphate		(b)	Sodium hydrogensulp	hate			
	(c) Iron(II) ammonium	sulphate	(d)	Tetrammine copper(II) sulp	hate.		
(viii)	Aqua regia is a mixture	of:						
	(a) Dilute hydrochloric	acid and concentrated nitri	c acid.					
	(b) Concentrated hydroc	hloric acid and dilute nitri	c acid.					
	(c) Concentrated hydroc	hloric acid [1 part] and co	ncentr	ated nitric acid [3 part	s]			

(d) Concentrated hydrochloric acid [3 parts] and concentrated nitric acid [1 part]

(ix)		organic co Methanol	ompound mix	xed with etha		it spurious		(d)	Ethanoic acid	
(v)	` ′		f alactrone n	resent in the		` /		(u)	Linanoie acid	
(A)	(a)		ciccirons p	(b) 3	vaichee sher	(c) 5	3011 15 .	(d)	7	
(xi)	` ′		following is	a common cl	haracteristic	` /	nt compound		•	
(111)		High melt	_	u common ci		or a covare	in compound	•		
		_	- 1	hen it is in the	he molten st	ite.				
			of molecules.							
	(d)	Always so	oluble in wat	ter.						
(xii)	Am	monium hy	droxide will	l produce a re	eddish browi	precipitate	when added	l to a solut	ion of:	
	(a)	$CuSO_4$		(b) Zn(NO ₃	$()_2$	(c) FeSo	O_4	(d)	FeCl ₃	
(xiii)			n solution gi	ves a bluish	white precip	tate with N	IaOH solution	n and a wh	ite precipitate wi	th BaCl ₂
		ition is:		4) 5 60		() = (~~ `	(1)	a a	
		CuSO ₄		(b) FeSO ₄		(c) Fe ₂ (CuCl ₂	
(xiv)	-	_	ride can be	obtained by a	_	-				
		NaCl		(b) Na ₂ SO ₄		(c) Na ₂ ($2O_3$	(d)	NaNO ₃	
(xv)			_	actions gives		_	111 4 1	1 11 '	* 4	• 1
		_	-		copper oxide		_		acid to copper ox	ade.
	(c)	Heating co	opper oxide.			(d) Pass	ing oxygen o	ver neated	copper oxide?	
(*)	(1)	(1)	(***)	<i>(</i> *		WERS			(1)	
	(d)	(ii) (d)	(iii) (c)	(iv) (a)	(v) (a)	(vi) (c			(d)	
(ix)	(a)	(x) (d)	(xi) (c)	(xii) (d)	(xiii) (a)	(xiv) (a) (xv) (a))		
		•								
Ques	tion	2								
-			below are re	elated to the	manufacture	of ammoni	a.			[5]
-	The (a)	questions Name the	process.			of ammoni	a.			[5]
-	The (a) (b)	questions Name the In what ra	process. atio must the	e reactants be		of ammoni	a.			[5]
-	The (a) (b) (c)	questions Name the In what ra Name the	process. ntio must the catalyst use	e reactants be	taken?		a.			[5]
-	The (a) (b) (c) (d)	questions Name the In what ra Name the Give the	process. atio must the catalyst use equation for	e reactants be d. the manufact	taken?	nia.		gyah a maa	, tion	[5]
(i)	The (a) (b) (c) (d) (e)	questions Name the In what ra Name the Give the e Ammonia	process. atio must the catalyst use equation for can act as a	e reactants be	taken?	nia.		such a reac	ction.	[5]
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(i)	The (a) (b) (c) (d) (e) (a) (b)	questions Name the In what ra Name the Give the e Ammonia Haber's pr Nitrogen (process. atio must the catalyst use equation for can act as a rocess. (1 part), hyd	e reactants be d. the manufact a reducing ag rogen (3 part	taken? ture of ammonent — write (s) by volume	nia. a relevant		such a read	etion.	[5]
(i)	The (a) (b) (c) (d) (e) (a) (b) (c)	questions Name the In what ra Name the Give the 6 Ammonia Haber's pr Nitrogen (Iron conta	process. atio must the catalyst use equation for can act as a rocess. (1 part), hyd ining molyb	e reactants be d. the manufact a reducing agrogen (3 part dneum as pro	taken? ture of ammodent — write (s) by volument omoter.	nia. a relevant		such a read	ction.	[5]
(i)	The (a) (b) (c) (d) (e) (a) (b) (c) (d)	questions Name the In what ra Name the Give the ϵ Ammonia Haber's pr Nitrogen (Iron conta $N_2(g) + 3$	process. atio must the catalyst use equation for can act as a rocess. (1 part), hydrining molyb $H_2(g) = \frac{200}{450}$	e reactants be d. the manufact a reducing agrogen (3 part dneum as pro	taken? ture of ammorent — write as) by volume bomoter. 2NH ₃ (g)	nia. a relevant		such a read	ction.	[5]
(i) Ans.	The (a) (b) (c) (d) (e) (a) (b) (c) (d) (e)	questions Name the In what ra Name the Give the 6 Ammonia Haber's pr Nitrogen (Iron conta $N_2(g) + 3$ 3CuO + 2	process. atio must the catalyst use equation for can act as a rocess. (1 part), hydrining molyb $H_2(g) = \frac{200}{450}$ $ENH_3(g) = \frac{he}{450}$	e reactants be d. the manufact a reducing agrogen (3 part dneum as pro -900 Atms - C - Fe-Mo 3Cu + N	taken? ture of ammoment — write as) by volume bomoter. as $2NH_3(g)$ and $N_2 + 3H_2O$	nia. a relevant e.	equation for	such a read	ction.	
(i) Ans.	The (a) (b) (c) (d) (e) (a) (b) (c) (d) (e)	questions Name the In what ra Name the Give the 6 Ammonia Haber's pr Nitrogen (Iron conta $N_2(g) + 3$ 3CuO + 2	process. atio must the catalyst use equation for can act as a rocess. (1 part), hydrining molyb $H_2(g) = \frac{200}{450}$ $H_3(g) = \frac{hc}{450}$ ys given in	e reactants be d. the manufact a reducing agrogen (3 part dneum as pro - 900 Atms C - Fe-Mo at 3Cu + N column A to	taken? ture of ammoment — write as) by volume bomoter. as $2NH_3(g)$ and $N_2 + 3H_2O$	nia. a relevant e.	equation for	such a read	ction.	[5]
(i) Ans.	The (a) (b) (c) (d) (e) (a) (b) (c) (d) (e)	questions Name the In what ra Name the Give the α Ammonia Haber's pr Nitrogen (Iron conta $N_2(g) + 3$ $3CuO + 2$ $3Ch$ the allo	process. In the process at the catalyst use equation for can act as a process. (1 part), hydrining molyb $H_2(g) = \frac{200}{450}$ $H_3(g) = \frac{hc}{450}$ by given in	e reactants be d. the manufact a reducing agrogen (3 part dneum as pro -900 Atms - °C - Fe-Mo that A 3Cu + N column A to	taken? ture of ammodent — write as) by volume comoter. 2NH ₃ (g) N ₂ + 3H ₂ O the uses giv	onia. a relevant c. en in colun	equation for nn B: Column B	such a read	etion.	
(i) Ans.	The (a) (b) (c) (d) (e) (a) (b) (c) (d) (e)	questions Name the In what ra Name the Give the α Ammonia Haber's pr Nitrogen (Iron conta $N_2(g) + 3$ $3CuO + 2$ ch the allo	process. atio must the catalyst use equation for can act as a rocess. (1 part), hydrining molyb $H_2(g) = \frac{200}{450}$ $ENH_3(g) = \frac{he}{450}$ ys given in C (a) Duralumi	e reactants be d. the manufact a reducing agrogen (3 part dneum as pro -900 Atms - °C - Fe-Mo that A 3Cu + N column A to	taken? ture of ammoment — write as) by volume omoter. as $2NH_3(g)$ $N_2 + 3H_2O$ the uses giv 1. If	nia. a relevant c. en in colun	equation for nn B: Column B	such a read	ction.	
(i) Ans.	The (a) (b) (c) (d) (e) (a) (b) (c) (d) (e)	questions Name the In what ra Name the Give the α Ammonia Haber's pr Nitrogen (Iron conta $N_2(g) + 3$ $3CuO + 2$ ch the allo	process. In the process at the catalyst use equation for can act as a process. (1 part), hydrining molyb $H_2(g) = \frac{200}{450}$ $H_3(g) = \frac{hc}{450}$ by given in	e reactants be d. the manufact a reducing agrogen (3 part dneum as pro -900 Atms - °C - Fe-Mo that A 3Cu + N column A to	taken? ture of ammoment — write as) by volume omoter. as 2NH ₃ (g) The uses give 1. Here is a second content of the uses give in the use of the use o	nia. a relevant c. en in colun clectrical fu	equation for nn B: Column B se truments	such a read	etion.	
(i) Ans.	The (a) (b) (c) (d) (e) (a) (b) (c) (d) (e)	questions Name the In what ra Name the Give the e Ammonia Haber's pr Nitrogen (Iron conta N ₂ (g) + 3 3CuO + 2 ch the allo	process. atio must the catalyst use equation for can act as a rocess. (1 part), hydrining molyb $H_2(g) = \frac{200}{450}$ $ENH_3(g) = \frac{he}{450}$ ys given in C (a) Duralumi	e reactants be d. the manufact a reducing agrogen (3 part dneum as pro -900 Atms - °C - Fe-Mo that A 3Cu + N column A to	taken? ture of ammoment — write as) by volume omoter. as 2NH ₃ (g) The uses give 1. Here is a second content of the uses give in the use of the use o	nia. a relevant c. en in colun	equation for nn B: Column B se truments	such a read	ction.	
(i) Ans.	The (a) (b) (c) (d) (e) (a) (b) (c) (d) (e)	questions Name the In what ra Name the Give the G Ammonia Haber's pr Nitrogen (Iron conta $N_2(g) + 3$ $3CuO + 2$ ch the allo	process. atio must the catalyst use equation for can act as a rocess. (1 part), hydrining molyb $H_2(g) = \frac{200}{450}$ $ENH_3(g) = \frac{he}{450}$ ys given in (a) Duralumit (b) Solder	e reactants be d. the manufact a reducing ag rogen (3 part dneum as pro -900 Atms - C - Fe-Mo column A to column A in	taken? ture of ammoment — write as) by volume omoter. as 2NH ₃ (g) N ₂ + 3H ₂ O the uses giv 1. If 2. S 3. A	nia. a relevant c. en in colun clectrical fu	equation for nn B: Column B se truments y	such a read	etion.	
(i) Ans.	The (a) (b) (c) (d) (e) (a) (b) (c) (d) (e)	questions Name the In what ra Name the Give the ϵ Ammonia Haber's pr Nitrogen (Iron conta $N_2(g) + 3$ $3CuO + 2$ $ch the allo$	process. atio must the catalyst use equation for can act as a rocess. (1 part), hydrining molybe $H_2(g) = \frac{200}{450}$ $H_3(g) = \frac{be}{450}$ $H_3(g) = $	e reactants be d. the manufact a reducing ag rogen (3 part dneum as pro -900 Atms - C - Fe-Mo column A to column A in	taken? ture of ammoment — write (s) by volume omoter. (2NH ₃ (g)) (1. If (2. S) (3. A) (4. If	en in colunt lectrical fururgical institution	equation for nn B: Column B see truments y articles	such a read	ction.	
(i) Ans.	The (a) (b) (c) (d) (e) (a) (b) (c) (d) (e) Mat	questions Name the In what ra Name the Give the e Ammonia Haber's pr Nitrogen (Iron conta N ₂ (g) + 3 3CuO + 2 ch the allo	process. atio must the catalyst use equation for can act as a rocess. (1 part), hydrining molyb (200 450 (200 45	e reactants be d. the manufact a reducing ag rogen (3 part dneum as pro -900 Atms - C - Fe-Mo column A to column A in	taken? ture of ammodent — write s) by volume omoter. 2NH ₃ (g) N ₂ + 3H ₂ O the uses giv 1. H 2. S 3. A 4. I 5. S	en in colunt clectrical furgical institute a	equation for nn B: Column B see truments y articles	such a read	etion.	

(iii)	Complete the following by choosing the correct answers from the bracket:	[5]
	(a) Metals are good (oxidizing agents / reducing agents) because they are electron (acceptors / donors).	
	(b) Electrovalent compounds have (high / low) melting points.	
	(c) Higher the pH value of a solution, the more (acidic / alkaline) it is.	
	(d) (AgCl / PbCl ₂), a white precipitate is soluble in excess NH ₄ OH.	
	(e) Conversion of ethene to ethane is an example of (hydration / hydrogenation).	
Ans.	(a) 1. Reducing agents 2. Donors	
	(b) High (c) Alkaline (d) AgCl (e) Hydrogenation.	
(iv)	Identify the following:	[5]
	(a) An acidic gas which gives dense white fumes with NH_3 .	
	(b) An alkane whose molecular mass is 58. $(H = 1; C = 12)$	
	(c) A solid which when kept in the open, forms a solution after sometime.	
	(d) An alloy used in electrical fittings.	
A ma	(e) A metal which gives hydrogen gas on reacting with both dilute acid and alkali.(a) HCl gas(b) Butane(c) Anhydrous calcium chloride(d) Brass(e) Zinc in the control of the contr	oto1
	(a) HCl gas (b) Butane (c) Anhydrous calcium chloride (d) Brass (e) Zinc in Draw different isomers having the following molecular formula:	
(٧)	(a) C_5H_{12} (chain) (b) C_4H_8 (position).	[5]
Anc		
A115.	(a) H ₃ C—CH ₂ —CH ₂ —CH ₂ —CH ₃ Pentane or <i>n</i> -pentane	
	H ₃ C—CH—CH ₂ —CH ₃ 2-methyl butane or isopentane CH ₃	
	$\dot{\text{CH}}_3$	
	CH ₃ CH ₃ H ₃ C—C—CH ₃ CH ₃ 2-2 dimethyl propane or neopentane CH ₃ CH ₃ (b) H C CH CH—CH 1 butane	
	H C C C CH 2-2 dimethyl propane or neopentane	
	H ₃ C—C—CH ₃ 2-2 difficulty propane of neopentane	
	$\mathrm{CH}_{\scriptscriptstyle 3}$	
	(b) H_3C — CH_2 — $CH=CH_2$ 1-butene	
	H_3C — CH = CH — CH_3 2-butene	
	113C CIT CIT CITS 2 butche	
	Section B	
	(Attempt any four questions.)	
_	stion 3	
(i)	Aqueous copper sulphate solution is electrolysed using copper electrode.	[2]
	(a) What happens to anode?	
Ans	(b) What happens to electrolyte (copper sulphate solution)?	
Ans.	(a) The anode slowly dissolves i.e., the loss in weight of the anode.(b) The colour of copper sulphate does not change because loss in weight of the anode is always equal.	1 to the
	gain in weight of the cathode.	ii to tiic
(ii)	Write the products and balance the equation.	[2]
. /	(a) $(NH_4)_2SO_4 + NaOH \longrightarrow$	
	(b) $KMnO_4 + HCl \longrightarrow$	
Ans.	(a) $(NH_4)_2SO_4 + 2NaOH \longrightarrow Na_2SO_4 + 2H_2O + 2NH_3(g)$	
	(b) $2KMnO_4 + 16HCl \longrightarrow 2KCl + 2MnCl_2 + 8H_2O + 5Cl_2$	
	2 2 2	

	Amongst the list of elements given above pick out:
	(a) Most electropositive element
	(b) Most electronegative element
	(c) Noble gases
Ans.	(a) Most electropositive element — K
	(b) Most electronegative element — F
	(c) Noble gases — Ne and Ar
(iv)	Complete the following by selecting the correct option from the choices given: [3]
	(a) pH of acetic acid is greater than dilute sulphuric acid. So acetic acid contains concentration of H ⁺
	ions. (greater, same, low)
	(b) The indicator which does not change colour on passage of HCl gas is (methyl orange, moist blue litmus, phenolphthalein)
	(c) The acid which cannot act as an oxidizing agent is (conc. H ₂ SO ₄ , conc. HNO ₃ , conc. HCl)
Ans.	(a) Low (b) Phenolphthalein (c) Conc. HCl
-	tion 4
(1)	The following questions are relevant to the extraction of Aluminium: [2]
	(a) State the reason for addition of caustic alkali to bauxite ore during purification of bauxite.
A m.a	(b) Give a balanced chemical equation for the above reaction.
Ans.	(a) The caustic alkali dissolves aluminium oxide to form sodium aluminate, but impurities do not dissolve in it.
(::)	(b) $Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + H_2O$
(11)	A compound made up of two elements X and Y has an empirical formula X_2Y . If the atomic weight of X is 10 and that of Y is 5 and the compound has a variour density 25, find its molecular formula.
Anc	and that of Y is 5 and the compound has a vapour density 25, find its molecular formula. [2] Examining I weight of Y $V = 2(10) + 1(5) = 25$
Alls.	Empirical weight of $X_2Y = 2(10) + 1(5) = 25$
	Vapour density of $X_2Y = 25$.
	\therefore Molecular weight of $X_2Y = 2 \times \text{vapour density}$
	$=2\times25=50.$
	Now, Molecular weight $= n \times \text{empirical weight}$
	$50 = n \times 25$
	$\therefore \qquad n = 2.$
	\therefore Molecular formula of compound = $n \times$ Empirical formula
	$= 2 \times (\mathbf{X}_2 \mathbf{Y}) = \mathbf{X}_4 \mathbf{Y}_2.$
(iii)	(a) What is the special feature of the apparatus that is used in the laboratory preparation of nitric acid? [3]
	(b) Why should the temperature of the reaction mixture of nitric acid not be allowed to rise above 200°C?
Ans.	(a) The apparatus is all glass as nitric acid vapour is highly corrosive.
	(b) If the temperature rises above 200°C, sodium sulphate is formed, which partially fuses in glass apparatus.
	Thus, glass apparatus becomes useless for further use.
(iv)	Explain the following: [3]
	(a) During electrolysis of molten lead bromide graphite anode is preferred to other electrodes.
	(b) The electrical conductivity of acetic acid is less in comparison to the electrical conductivity of dilute sulphuric
	acid at a given concentration.
	(c) Difference between calcination and roasting.
Ans.	(a) Bromide ions discharge at anode to form bromine gas. This gas is highly corrosive and reacts with metallic
	anode. To avoid corrosion of anode, graphite is preferred as it does not react with bromine and is a good
	conductor of electricity.

(iii) Li, Be, B, C, N, O, F, Ne, Na, Mg, Al, Si, P, S, Cl, Ar, K and Ca.

[3]

- (b) The acetic acid molecules dissociate very little (about 4%) compared to sulphuric acid molecules (about 90%). Thus, electrical conductivity of dilute acetic acid is less than dilute sulphuric acid.
- (c) Calcination is the process of heating the concentrated ore in the absence of air, such that the temperature is not sufficient to melt it. But roasting is the process of heating the concentrated ore in the presence of air to a high temperature.

Question 5

(i) (a) Why do covalent compounds exist as gases, liquids or soft solids?

[2]

[2]

- (b) Which electrode: anode or cathode is the oxidising electrode? Why?
- **Ans.** (a) The molecules of covalent compounds are acted upon by weak intermolecular forces. These forces are comparatively more than van der Waals' forces. However, they are fairly small, such that the molecules are not held firmly. So, the covalent compounds exist as gases or liquids or soft solids.
 - (b) Cathode is oxidising electrode. It is because it donates the electrons to positively charged ions and loss of electron means oxidation.
- (ii) Name a probable cation present based on the following observations:
 - (a) Dirty green precipitate insoluble in ammonium hydroxide.
 - (b) White precipitate sparingly soluble in sodium hydroxide.

Ans. (a) Fe^{2+}

(b) Ca^{2+}

(iii) Give balanced chemical equations for the following conversions A, B and C: [3]

$$Fe \xrightarrow{A} FeCl_3 \xrightarrow{B} FeCO_3 \xrightarrow{C} Fe(NO_3)_2$$

Ans. A. $2\text{Fe} + 3\text{Cl}_2 \xrightarrow{\text{Heat}} 2 \text{ FeCl}_3$

B. (i) $2\text{FeCl}_3 + \text{SO}_2 + 2\text{H}_2\text{O} \longrightarrow \text{H}_2\text{SO}_4 + 2\text{FeCl}_2 + 2\text{HCl}$

(ii)
$$FeCl_2 + Na_2CO_3 \longrightarrow FeCO_3 + 2NaCl$$

C.
$$FeCO_3 + 2HNO_3 \longrightarrow Fe(NO_3)_2 + H_2O + CO_2$$

- (iv) State one **relevant** observation for each of the following: [3]
 - (a) Ammonium hydroxide solution is added to copper (II) nitrate solution in small quantities and then in excess.
 - (b) Ammonium hydroxide solution is added to zinc nitrate solution in minimum quantities and then in excess.
 - (c) Lead nitrate crystals are heated in a hard glass test tube.
- **Ans.** (a) With small amount of ammonium hydroxide, a bluish white precipitate is formed. This precipitate dissolves in excess of ammonium hydroxide to form a deep blue solution.
 - (b) A white gelatin like precipitate is formed which dissolves in excess of ammonium hydroxide.
 - (c) It gives off a reddish brown gas (NO₂). The crystals crumble to form a powdery mass, which is yellow when hot and white when cold.

Question 6

(i) State what would you observe when:

[2]

- (a) Washing soda crystals are exposed to the atmosphere.
- (b) The salt ferric chloride is exposed to the atmosphere.
- Ans. (a) A fluffly white deposit is formed on the surface of crystals. The fluffy white deposit is Na₂CO₃.H₂O.
 - (b) It absorbs moisture from air to form reddish brown liquid.
- (ii) LPG stand for liquefied petroleum gas. Varieties of LPG are marketed including a mixture of propane (60%) and butane (40%). If **10 litre** of this mixture is burnt, find the total volume of carbon dioxide gas added to the atmosphere. Combustion reactions can be represented as: [2]

$$C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$$

 $2C_4H_{10}(g) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(g)$

Ans. (a) Volume of CO_2 added by propane :

(b) Volume of CO₂ added by butane.

- \therefore Total volume of carbon dioxide added = (18 + 16) = 34 Lt.
- (iii) Some properties of sulphuric acid are listed below. Choose the property A, B, C, or D which is responsible for the reactions (a) to (c). [3]

C: Non-volatile acid

A : Acid B : Dehydrating agent (a) $S + 2H_2SO_4 \longrightarrow 3SO_2 + 2H_2O$

(b) NaCl + $H_2SO_4 \longrightarrow NaHSO_4 + HCl$

(c) $CuO + H_2SO_4 \longrightarrow CuSO_4 + H_2O$

Ans. (a) $S + 2H_2SO_4 \longrightarrow 3SO_2 + 2H_2O$

[D] Oxidizing agent

(b) $NaC1 + H_2SO_4 \longrightarrow NaHSO_4 + HC1$

[C] Non-volatile acid

(c) $CuO + H_2SO_4 \longrightarrow CuSO_4 + H_2O$

[A] Acid

(iv) Identify the acid which matches the following description (a) to (c):

[3]

- (a) The acid which produces sugar charcoal from sugar.
 - (b) The acid which is prepared by catalytic oxidation of ammonia.
- (c) The acid on mixing with lead nitrate solution produces a white precipitate which is insoluble even on heating.

Ans. (a) Concentrated sulphuric acid.

(b) Nitric acid

(c) Dilute sulphuric acid.

D: Oxidizing agent

Ouestion 7

(i) A gaseous hydrocarbon of vapour density 29, contains 82.76% of carbon. Calculate its empirical formula and molecular formula. [C = 12, H = 1]

Ans. % age of carbon = 82.76%.

 \therefore % age of hydrogen = (100 - 82.76) = 17.24%

Elements	% age weight	At. wt.	Relative number of moles	Simple ratio of atoms
С	82.76	12	$82.76 \div 12 = 6.89$	$6.89 \div 6.89 = 1 \text{ or } 2$
Н	17.24	1	$17.24 \div 1 = 17.24$	$17.24 \div 6.89 = 2.5 \text{ or } 5$

- \therefore Empirical formula of hydrocarbon is C_2H_5 .
- \therefore Empirical formula mass of hydrocarbon = 2(12) + 5(1) = 29

Vapour density of hydrocarbon

= 29

:. Molecular mass of hydrocarbon

$$= 2 \times V.D. = 2 \times 29 = 58$$

Now,

 $n \times \text{Empirical formula mass} = \text{Molecular mass}$

$$n \times 29 = 58$$

$$n = 2$$

- \therefore Molecular formula of hydrocarbon = $n \times$ Empirical formula = $2 \times C_2H_5 = C_4H_{10}$.
- (ii) Name the functional group present in

[2]

[3]

- (a) CH₃COCH₃
- (b) CH₃CHO

Ans. (a) $\mathcal{L} = O$ (Ketonic group)

- (b) –CHO (Aldehydic group)
- (iii) A metal article is to be electroplated with silver. The electrolyte selected is sodium argentocyanide.
 - a) State and condition to anyway that the democit is amouth from and long lecting
 - (a) State one condition to ensure that the deposit is smooth, firm and long lasting.

- (b) Write the reaction taking place at the cathode.
- (c) Write the reaction taking place at the anode.

Ans. (a) The metal to be electroplated should be absolutely free from oxides of metals, grease, etc., and low current density should be used.

- (b) $Ag^+ + e^- \longrightarrow Ag$ [at cathode]
- (c) $Ag e^- \longrightarrow Ag^+$ [at anode]
- (iv) (a) Give two examples of weak acids.

[3]

- (b) Give two examples of bases which are not soluble in water.
- (c) The pH of a solution is 5. To this solution is added a liquid when the pH decreases to 3. What is nature of liquid added to the solution?
- Ans. (a) (1) Carbonic acid (H₂CO₃)
- (2) Sulphurous acid (H₂SO₃).
- (b) (1) Copper hydroxide [Cu(OH)₂]
- (2) Iron (II) hydroxide [Fe(OH)₂]
- (c) Liquid is acidic in nature and has pH less than 3.

Question 8

(i) Give the electron dot structure of the following:

[2]

- (a) NH₃
- (b) H_3O^+

(ii) Answer the following questions:

[2]

- (a) How will you distinguish between Ammonium hydroxide and Sodium hydroxide using copper sulphate solution?
- (b) How will you distinguish between dilute hydrochloric acid and dilute sulphuric acid using lead nitrate solution?
- **Ans.** (a) Sodium hydroxide forms a pale blue precipitate which is insoluble in excess of sodium hydroxide.
 - Ammonium hydroxide forms a pale blue precipitate which dissolves in excess of ammonium hydroxide to form deep blue coloration.
 - (b) Hydrochloric acid forms a white precipitate with lead nitrate solution. This precipitate dissolves on warming the reaction mixture so as to form clear solution. Sulphuric acid forms a white precipitate with lead nitrate solution. This precipitate does not dissolve on warming the reaction mixture.
- (iii) Name the particles present in:

[3]

- (a) Strong electrolyte (b) Non-electrolyte
- (c) Weak electrolyte

- **Ans.** (a) Mainly ions
- (b) Only molecules
- (c) Ions and Molecules
- (iv) The metals of Group 2 from top to bottom are Be, Mg, Ca, Sr, and Ba.

[3]

- (a) Which one of these elements will form ions most readily and why?
 - (b) State the common feature in the electronic configuration of all these elements.
- **Ans.** (a) Barium will ionise most readily because the 2 electrons in its valence shell are far away from the nucleus. Thus, barium can easily donate these electrons and ionises readily.
 - (b) All the elements in the list have two valence electrons.