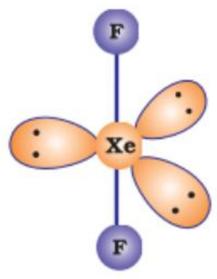
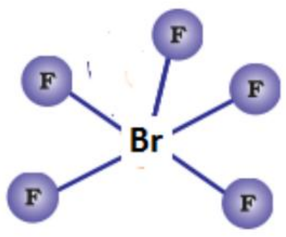
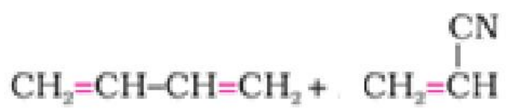
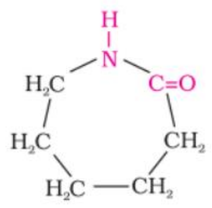
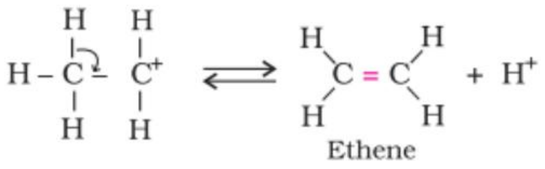
Marking scheme – 2017-18

CHEMISTRY (043)/ CLASS XII (Compartment Exam)

56/2

Q.No	Value Points	Marks
1	$[Pt(NH_3)_4][CuCl_4]$	1
2	2-Methylprop-1-ene / isobutene / structure	1
3	Order of reaction = ½	1
4	Due to the bond formation between the adsorbent and the adsorbate.	1
5	$C_6H_5COCH_3$	1
6	i) Mn ii) Mischmetall	1 1
7	 ,  (square pyramidal)	1,1
8	Intermolecular forces of attraction between carbon disulphide and acetone are weaker than the pure components. Minimum boiling azeotrope at a specific composition	1 1
9	Quantity of charge required to deposit 108 g of silver = 96500 C Quantity of charge required to deposit 1.50 g of silver $= \frac{96500}{108} \times 1.50 = 1340.28$ C Time taken $= \frac{Q}{I} = \frac{1340.28}{1.50} = 893.5$ s (or by any other suitable method)	½ ½ 1
	OR	
9	$\Lambda m = \frac{1000\ k}{C}$ $\Lambda m = \frac{1.65 \times 10^{-4} \times 1000}{0.01}$ $= 16.5\ S\ cm^2\ mol^{-1}$	½ ½ 1
10.	$CH_3CH_2CH_2Cl$, due to primary halide which has less steric hindrance	1,1
11	i)  ii)  iii) 	1 1 1
12	Moles for $MgBr_2 = \frac{10.5}{184} = 0.0571$ mol Molality $= \frac{0.0571}{200} \times 1000 = 0.2855$ m i=3 $\Delta T_f = i\ K_f\ m$ $= 3 \times 1.86 \times 0.2855$ $= 1.59$ K Freezing point = 273 – 1.59 = 271.41K or -1.59 °C	½ ½ 1 1

*These answers are meant to be used by evaluators

13	i) ii) iii)	Hexaamminenickel(II) chloride Potassium hexacyanidoferrate(III) Tris(ethane-1,2-diamine)cobalt(III) ion	1 1 1
14	i) ii) iii)	The precipitated silver iodide adsorbs iodide ions from the dispersion medium resulting in the negatively charged colloidal solution. Due to large surface area If the dispersion medium is separated from the dispersed phase , the sol can be reconstituted by simply remixing with the dispersion medium. That is why these sols are also called reversible sols.	1 1 1
15	i)	$C_2H_5OH \xrightarrow[443\ K]{H_2SO_4} CH_2 = CH_2 + H_2O$ *Step 1:* Formation of protonated alcohol.  Ethanol — Protonated alcohol (Ethyl oxonium ion) *Step 2:* Formation of carbocation: It is the slowest step and hence, the rate determining step of the reaction.  *Step 3:* Formation of ethene by elimination of a proton.  Ethene	½ ½ ½ ½
	ii)	o-Nitrophenol is steam volatile due to intramolecular hydrogen bonding while p-nitrophenol is less volatile due to intermolecular hydrogen bonding.	1
16	i) ii) iii)	Propene 4-nitrochlorobenzene and 2-nitrochlorobenzene / structures Methylcyanide / Ethanenitrile / structure	1 ½ + ½ 1
17	i) ii) iii)	Rate = $k[A][B]^2$ Rate becomes 9 times Rate becomes 8 times	1 1 1
18	i) a) b) ii)	$5SO_3^{2-} + 2MnO_4^- + 6H^+ \longrightarrow 2Mn^{2+} + 3H_2O + 5SO_4^{2-}$ $Cr_2O_7^{2-} + 14\ H^+ + 6\ Fe^{2+} \rightarrow 2\ Cr^{3+} + 6\ Fe^{3+} + 7\ H_2O$ **$Cr^{2+} < Fe^{2+} < Mn^{2+}$**	1 1 1
		OR	
18	i) ii) iii)	$3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$ (or any other correct equation) $4\ FeCr_2O_4 + 8\ Na_2CO_3 + 7\ O_2 \rightarrow 8\ Na_2CrO_4 + 2\ Fe_2O_3 + 8\ CO_2$ $2\ CrO_4^{2-} + 2H^+ \rightarrow Cr_2O_7^{2-} + H_2O$	1 1 1
19.	i) ii) iii)	$Cu(s)\,|\,Cu^{2+}(aq)\,||\,Ag^+(aq)\,|\,Ag(s)$ Current will flow from silver to copper electrode in the external circuit. Cathode : $2Ag^+(aq) + 2e^- \rightarrow 2Ag(s)$ Anode : $Cu(s) \rightarrow Cu^{2+}(aq) + 2e^-$	1 1 ½ + ½
20.	i) ii) iii)	$(CH_3)_3N < CH_3NH_2 < (CH_3)_2NH$ A : $C_6H_5N_2^+Cl^-$ B: C_6H_5OH $R{-}NH_2 + CHCl_3 + 3KOH \xrightarrow{Heat} R{-}NC + 3KCl + 3H_2O$	1 1 1

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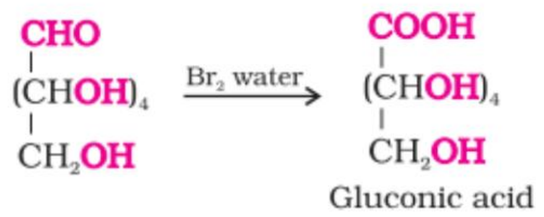
21	i) Due to the formation of zwitter ion. ii) The two strands are complementary to each other because the hydrogen bonds are formed between specific pairs of bases iii)  Gluconic acid Or glucose gets oxidised to gluconic acid on reaction with mild oxidising agent like Bromine water.	1 1 1
22	a) Gold is leached out in the form of a complex with dil. solution of NaCN in the presence of air/ NaCN acts as leaching agent. b) It lowers the melting point of alumina and makes it a good conductor of electricity. c) CO forms a volatile complex with nickel which is further decomposed to give pure Ni metal.	1 1 1
23	a) Tranquilizers b) It may cause harmful effects and may acts as poison in case of overdose. Therefore, a doctor should be always consulted. c) Phenacetin d) Empathetic , Caring , sensitive (or any other two relevant values)	1 1 1 1
24	i) a) Antiferromagnetism b) i) Schottky defect ii) Frenkel Defect i) $d=\frac{zM}{a^3\ Na}$ z=4 $11.2=\frac{4\times M}{(4\times10^{-8})^3\times(6.02\times10^{23})}$ M= 107.9 g/mol Atomic mass = 107.9 u	1 ½ + ½ ½ ½ ½ 1 ½
	OR	
24	$r=\frac{a}{2\sqrt{2}}$ $=\frac{3.0\times10^{-8}}{2\times1.414}$ $= 1.06\times10^{-8}$ cm $d=\frac{zM}{a^3\ Na}$ z=4 $d=\frac{4\times108}{(3\times10^{-8})^3\times(6.02\times10^{23})}$ $= 26.6\ g/cm^3$	½ ½ 1 ½ ½ 1 1
25	i)a) $2NaOH + Cl_2 \rightarrow NaCl + NaOCl + H_2O$ (cold and dilute) b) $2XeF_2\ (s) + 2H_2O(l) \rightarrow 2Xe\ (g) + 4\ HF(aq) + O_2(g)$ ii) a) Sulphur is sterically protected by six F atoms, hence does not allow the water molecules to attack. b) It contains only two ionisable H-atoms which are present as –OH groups, thus behaves as dibasic acid. c) Xe has least ionization energy among the noble gases and hence it forms chemical compounds particularly with O_2 and F_2.	1 1 1 1 1
	OR	
25	ii) a. Fluorine has less negative electron gain enthalpy than chlorine,	

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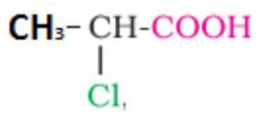
	b. Fluorine has low enthalpy of dissociation than chlorine c. Fluorine has very high enthalpy of hydration than chlorine. d. Fluorine is stronger oxidizing agent than chlorine. ii) a) iii) $3Cu + 8\ HNO_3(dilute) \rightarrow 3Cu(NO_3)_2 + 2NO + 4H_2O$ b) $2\ Fe^{3+} + SO_2 + 2H_2O \rightarrow 2\ Fe^{2+} + SO_4^{2-} + 4\ H^+$ c) $XeF_4 + O_2F_2 \rightarrow XeF_6 + O_2$ (Balancing of equations may be ignored)	½ ×4 1 1 1
26	i)a) Due to +I effect of methyl group in CH_3CHO. b)due to –I effect of nitro group in nitroacetic acid. c) Due to the strong electron withdrawing effect of the carbonyl group and resonance stabilisation of the conjugate base. ii) a) Add NaOH and I_2 to both the compounds and heat, ethanal gives yellow ppt of iodoform. b) Add NaOH and I_2 to both the compounds and heat, pentan-2-one gives yellow ppt of iodoform.	1 1 1 1 1
	OR	
26	a) i)a)  b) C_6H_5CHO c) $CH_3OH + HCOOK$ ii)a) $CH_3COCH_3 \xrightarrow{NaBH_4} CH_3CH(OH)CH_3 \xrightarrow{conc.H_2SO_4,\ 443K} CH_3\text{-}CH{=}CH_2$ b) $C_6H_5CH_2Cl \xrightarrow{KCN} C_6H_5CH_2CN \xrightarrow{H_3O^+} C_6H_5CH_2COOH$	1 1 1 1 1

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