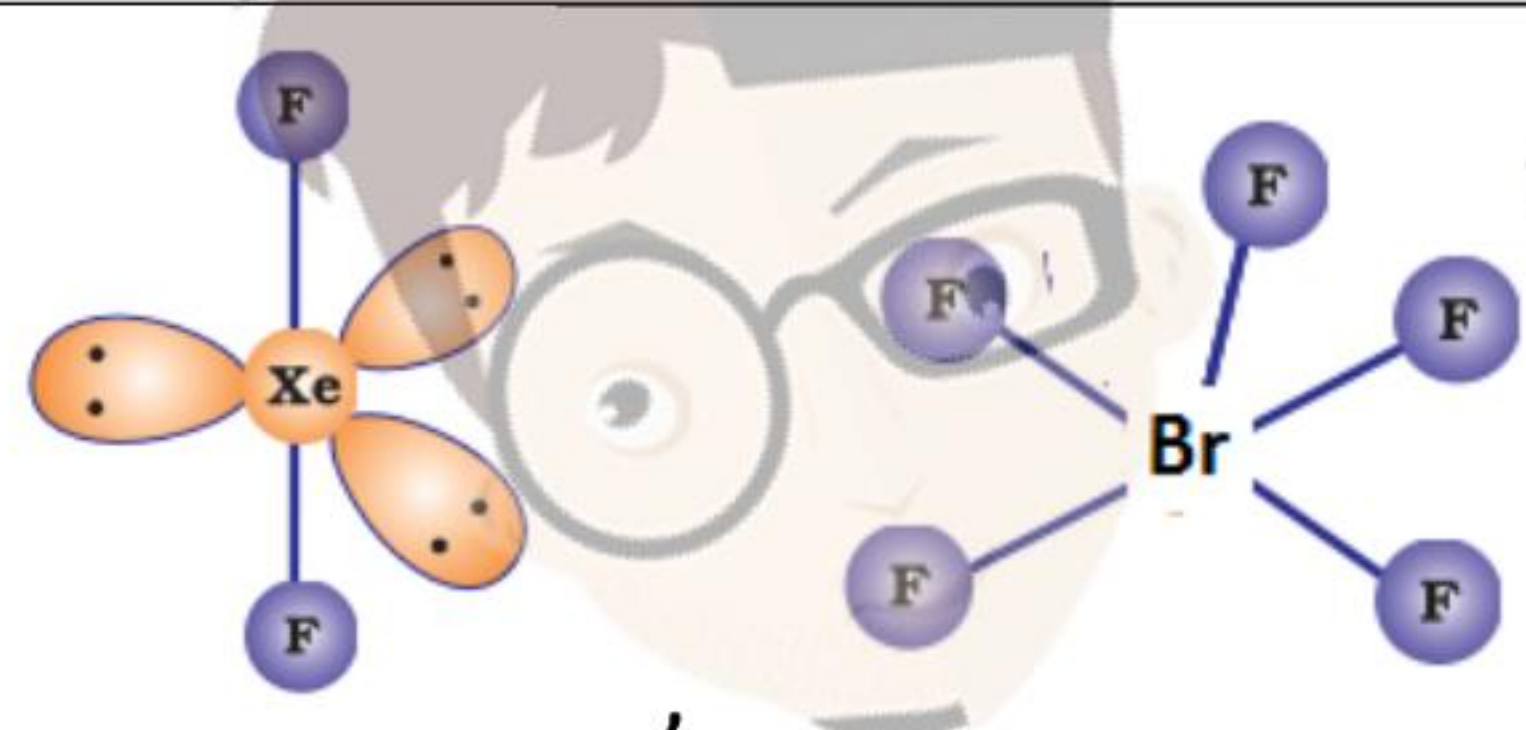
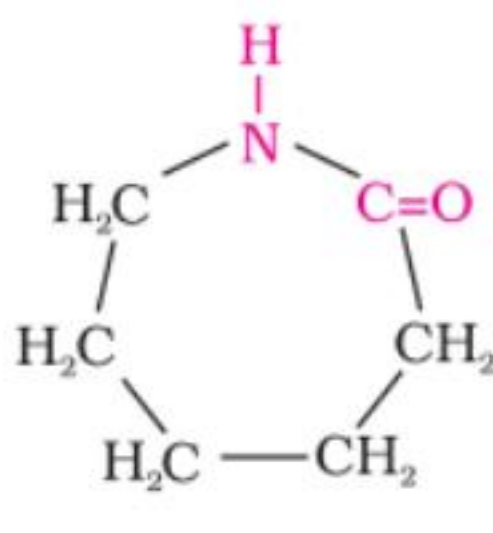


Marking scheme – 2017-18

CHEMISTRY (043)/ CLASS XII (Compartment Exam)

56/1

Q.No	Value Points	Marks
1	Order of reaction = $\frac{1}{2}$	1
2	Due to the bond formation between the adsorbent and the adsorbate.	1
3	$[\text{Pt}(\text{NH}_3)_4][\text{CuCl}_4]$	1
4	$\text{C}_6\text{H}_5\text{COCH}_3$	1
5	2-Methylprop-1-ene / isobutene / structure	1
6	Intermolecular forces of attraction between carbon disulphide and acetone are weaker than the pure components. Minimum boiling azeotrope at a specific composition	1 1
7	$\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$, due to primary halide which has less steric hindrance	1,1
8	Quantity of charge required to deposit 108 g of silver = 96500 C Quantity of charge required to deposit 1.50 g of silver = $\frac{96500}{108} \times 1.50 = 1340.28 \text{ C}$ Time taken = $\frac{Q}{I} = \frac{1340.28}{1.50} = 893.5 \text{ s}$ (or by any other suitable method)	$\frac{1}{2}$ $\frac{1}{2}$ 1
OR		
8	$\Lambda_m = \frac{1000 k}{C}$ $\Lambda_m = \frac{1.65 \times 10^{-4} \times 1000}{0.01}$ $= 16.5 \text{ S cm}^2 \text{ mol}^{-1}$	$\frac{1}{2}$ $\frac{1}{2}$ 1
9	 (square pyramidal)	1,1
10.	i) Mn ii) Mischmetall	1 1
11	i) Propene ii) 4-nitrochlorobenzene and 2-nitrochlorobenzene / structures iii) Methylcyanide / Ethanenitrile / structure	1 $\frac{1}{2} + \frac{1}{2}$ 1
12	Moles for $\text{MgBr}_2 = \frac{10.5}{184} = 0.0571 \text{ mol}$ Molality = $\frac{0.0571}{200} \times 1000 = 0.2855 \text{ m}$ i=3 $\Delta T_f = i K_f m$ $= 3 \times 1.86 \times 0.2855$ $= 1.59 \text{ K}$ Freezing point = $273 - 1.59 = 271.41\text{K}$ or $-1.59 \text{ }^\circ\text{C}$	$\frac{1}{2}$ $\frac{1}{2}$ 1 1
13	i) $\text{C}_2\text{H}_5\text{OH} \xrightarrow[443 \text{ K}]{\text{H}_2\text{SO}_4} \text{CH}_2 = \text{CH}_2 + \text{H}_2\text{O}$	$\frac{1}{2}$ $\frac{1}{2}$

	<p>Step 1: Formation of protonated alcohol.</p> $\begin{array}{ccc} \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \\ \text{Ethanol} \end{array} + \text{H}^+ & \xrightleftharpoons{\text{Fast}} & \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{O}^+-\text{H} \\ \quad \\ \text{H} \quad \text{H} \\ \text{Protonated alcohol} \\ \text{(Ethyl oxonium ion)} \end{array} \end{array}$ <p>Step 2: Formation of carbocation: It is the slowest step and hence, the rate determining step of the reaction.</p> $\begin{array}{ccc} \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{O}^+-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array} & \xrightleftharpoons{\text{Slow}} & \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}^+ \\ \quad \\ \text{H} \quad \text{H} \end{array} + \text{H}_2\text{O} \end{array}$ <p>Step 3: Formation of ethene by elimination of a proton.</p> $\begin{array}{ccc} \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}^+ \\ \quad \\ \text{H} \quad \text{H} \end{array} & \xrightleftharpoons{} & \begin{array}{c} \text{H} \quad \text{H} \\ \backslash \quad / \\ \text{C} = \text{C} \\ / \quad \backslash \\ \text{H} \quad \text{H} \\ \text{Ethene} \end{array} + \text{H}^+ \end{array}$ <p>ii) o-Nitrophenol is steam volatile due to intramolecular hydrogen bonding while p-nitrophenol is less volatile due to intermolecular hydrogen bonding.</p>	<p>1/2</p> <p>1/2</p> <p>1</p>
14	<p>i) Rate = k[A][B]²</p> <p>ii) Rate becomes 9 times</p> <p>iii) Rate becomes 8 times</p>	<p>1</p> <p>1</p> <p>1</p>
15	<p>i) Cu(s) Cu²⁺(aq) Ag⁺(aq) Ag(s)</p> <p>ii) Current will flow from silver to copper electrode in the external circuit.</p> <p>iii)</p> $\begin{array}{l} \text{Cathode} \quad : \quad 2\text{Ag}^+(\text{aq}) + 2\text{e}^- \rightarrow 2\text{Ag}(\text{s}) \\ \text{Anode} \quad \quad : \quad \text{Cu}(\text{s}) \rightarrow \text{Cu}^{2+}(\text{aq}) + 2\text{e}^- \end{array}$	<p>1</p> <p>1</p> <p>1/2 + 1/2</p>
16	<p>i) The precipitated silver iodide adsorbs iodide ions from the dispersion medium resulting in the negatively charged colloidal solution.</p> <p>ii) Due to large surface area</p> <p>iii) 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.</p>	<p>1</p> <p>1</p> <p>1</p>
17	<p>i) (CH₃)₃N < CH₃NH₂ < (CH₃)₂NH</p> <p>ii) A : C₆H₅N₂⁺ Cl⁻ B: C₆H₅OH</p> <p>iii) $\text{R}-\text{NH}_2 + \text{CHCl}_3 + 3\text{KOH} \xrightarrow{\text{Heat}} \text{R}-\text{NC} + 3\text{KCl} + 3\text{H}_2\text{O}$</p>	<p>1</p> <p>1</p> <p>1</p>
18	<p>i) Due to the formation of zwitter ion.</p> <p>ii) The two strands are complementary to each other because the hydrogen bonds are formed between specific pairs of bases</p> <p>iii)</p> $\begin{array}{ccc} \begin{array}{c} \text{CHO} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \end{array} & \xrightarrow{\text{Br}_2 \text{ water}} & \begin{array}{c} \text{COOH} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \\ \text{Gluconic acid} \end{array} \end{array}$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>Or glucose gets oxidised to gluconic acid on reaction with mild oxidising agent like Bromine water.</p> </div>	<p>1</p> <p>1</p> <p>1</p>
19.	<p>i) $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2 + \begin{array}{c} \text{CN} \\ \\ \text{CH}_2=\text{CH} \end{array}$</p> <p>ii) </p> <p>iii) $\text{HOH}_2\text{C}-\text{CH}_2\text{OH} + \text{HOOC}-\text{C}_6\text{H}_4-\text{COOH}$</p>	<p>1</p> <p>1</p> <p>1</p>
20.	<p>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.</p>	<p>1</p>

	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
21	i) Hexaamminenickel(II) chloride ii) Potassium hexacyanidoferrate(III) iii) Tris(ethane-1,2-diamine)cobalt(III) ion	1 1 1
22	i) a) $5\text{SO}_3^{2-} + 2\text{MnO}_4^- + 6\text{H}^+ \longrightarrow 2\text{Mn}^{2+} + 3\text{H}_2\text{O} + 5\text{SO}_4^{2-}$ b) $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{Fe}^{2+} \rightarrow 2\text{Cr}^{3+} + 6\text{Fe}^{3+} + 7\text{H}_2\text{O}$ ii) $\text{Cr}^{2+} < \text{Fe}^{2+} < \text{Mn}^{2+}$	1 1 1
	OR	
22	i) $3\text{MnO}_4^{2-} + 4\text{H}^+ \rightarrow 2\text{MnO}_4^- + \text{MnO}_2 + 2\text{H}_2\text{O}$ (or any other correct equation) ii) $4\text{FeCr}_2\text{O}_4 + 8\text{Na}_2\text{CO}_3 + 7\text{O}_2 \rightarrow 8\text{Na}_2\text{CrO}_4 + 2\text{Fe}_2\text{O}_3 + 8\text{CO}_2$ iii) $2\text{CrO}_4^{2-} + 2\text{H}^+ \rightarrow \text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O}$	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	$2\text{NaOH} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{NaOCl} + \text{H}_2\text{O}$ i)a) (cold and dilute) b) $2\text{XeF}_2(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{Xe}(\text{g}) + 4\text{HF}(\text{aq}) + \text{O}_2(\text{g})$ 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	
24	i) a. Fluorine has less negative electron gain enthalpy than chlorine, 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) $3\text{Cu} + 8\text{HNO}_3(\text{dilute}) \rightarrow 3\text{Cu}(\text{NO}_3)_2 + 2\text{NO} + 4\text{H}_2\text{O}$ b) $2\text{Fe}^{3+} + \text{SO}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{Fe}^{2+} + \text{SO}_4^{2-} + 4\text{H}^+$ c) $\text{XeF}_4 + \text{O}_2\text{F}_2 \rightarrow \text{XeF}_6 + \text{O}_2$ (Balancing of equations may be ignored)	$\frac{1}{2} \times 4$ 1 1 1
25	i)a) Due to +I effect of methyl group in CH ₃ CHO. 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	
25	a)	

	i)a) $\text{CH}_3-\underset{\text{Cl}}{\text{CH}}-\text{COOH}$ b) $\text{C}_6\text{H}_5\text{CHO}$ c) $\text{CH}_3\text{OH} + \text{HCOOK}$ ii)a) $\text{CH}_3\text{COCH}_3 \xrightarrow{\text{NaBH}_4} \text{CH}_3\text{CH}(\text{OH})\text{CH}_3 \xrightarrow{\text{conc. H}_2\text{SO}_4, 443\text{K}} \text{CH}_3-\text{CH}=\text{CH}_2$ b) $\text{C}_6\text{H}_5\text{CH}_2\text{Cl} \xrightarrow{\text{KCN}} \text{C}_6\text{H}_5\text{CH}_2\text{CN} \xrightarrow{\text{H}_3\text{O}^+} \text{C}_6\text{H}_5\text{CH}_2\text{COOH}$	1 1 1 1 1
26	i) a) Antiferromagnetism b) i) Schottky defect ii) Frenkel Defect ii) $d = \frac{zM}{a^3 Na}$ $z=4$ $11.2 = \frac{4 \times M}{(4 \times 10^{-8})^3 \times (6.02 \times 10^{23})}$ $M = 107.9 \text{ g/mol}$ $\text{Atomic mass} = 107.9 \text{ u}$	1 $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$
	OR	
26	$r = \frac{a}{2\sqrt{2}}$ $= \frac{3.0 \times 10^{-8}}{2 \times 1.414}$ $= 1.06 \times 10^{-8} \text{ cm}$ $d = \frac{zM}{a^3 Na}$ $z=4$ $d = \frac{4 \times 108}{(3 \times 10^{-8})^3 \times (6.02 \times 10^{23})}$ $= 26.6 \text{ g/cm}^3$	$\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$ 1 1