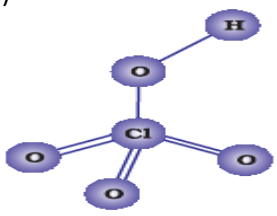
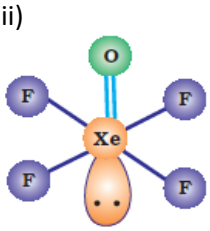
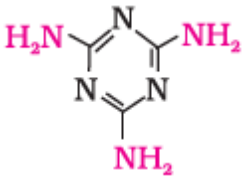
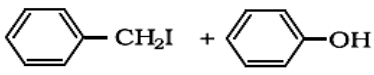
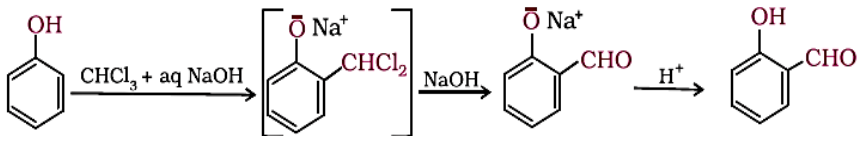
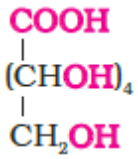
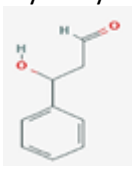
Marking scheme – 2020

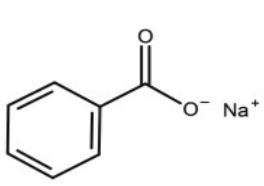
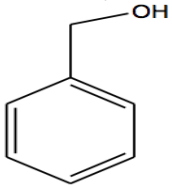
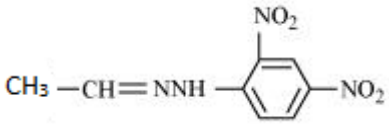
CHEMISTRY (043)/ CLASS XII

56/5/3

Q.No	Expected Answer / Value Points	Marks
	SECTION A	
1	By gaining one electron they acquire noble gas configuration	1
2	Extremely small size/ absence of d orbital/highest electronegativity	1
3	HI>HBr>HCl>HF	1
4	Low bond dissociation enthalpy and high hydration enthalpy	1
5	X >X'	1
6	$(CH_3)_4C$	1
7	$(CH_3)_2NH$	1
8	Cis-$[Pt(en)_2Cl_2]^{2+}$	1
9	Zone refining	1
10	Copolymer	1
11	(b)	1
12	(b)	1
13	(c)	1
14	(a)	1
15	(d)	1
16	(D)	1
17	(D)	1
18	(C)	1
19	(A)	1
20	(D)	1
	SECTION B	
21	(a) Hexacyanidoferrate(III) / Hexacyanoferrate(III) d^2sp^3 (b) Ligand which can ligate through two different atoms is called ambidentate ligand whereas di- or polydentate ligand uses its two or more donor atoms to bind a single metal ion. / a chelating ligand forms a more stable complex as compared to an ambidentate ligand. / chelating ligand forms a cyclic complex while ambidentate ligand forms a non-cyclic complex.	½ ½ 1
22	(i)  (ii)  	1 1
23	i) NaCN acts as a leaching agent / it forms complex with gold/ $[Ag(CN)_2]^-$ $4Au + 8CN^- + 2H_2O + O_2 \longrightarrow 4\,[Au(CN_2)]^- + 4OH^-$ (Balancing may be ignored) ii) CO acts as a reducing agent **OR**	1 1

23	• It is leached out using acid or bacteria • Electrolytic refining	1 1
24	(i) Glycol and terephthalic acid /  (ii) Melamine and formaldehyde/  	½+½ ½+½
25	• The accumulation of molecular species at the surface rather than in the bulk of a solid or liquid. Example: adsorption of gases on surface of active charcoal (or any other suitable example) • Adsorption of reactants occurs on surface of catalyst and reaction takes place. **OR** • A state of continuous zig-zag motion of particles. • Unbalanced bombardment of the particles by the molecules of the dispersion medium. • The Brownian movement has a stirring effect which does not permit the particles to settle.	1+½ ½ 1 ½ ½
26	• For a solution of volatile liquids, the partial vapour pressure of each component of the solution is directly proportional to its mole fraction present in solution. • If we compare the equations for Raoult's law and Henry's law, it can be seen that the partial pressure of the volatile component or gas is directly proportional to its mole fraction in solution.	1 1
27	(i) A chemical substance which in low concentrations inhibits the growth or destroys microorganisms. Example: Penicillin/Aminoglycosides/Ofloxacin (ii) Prevent spoilage of food due to microbial growth. Example: table salt/sugar/vegetable oils/sodium benzoate/salts of sorbic acid/salt of propanoic acid.	½ ½ ½ ½
	SECTION C	
28	i) $CH_3CH_2CH_2OH$ ii) $(CH_3)_2C=CH_2$ iii)  **OR** (i)  (Intermediate compound in above equation may be ignored) (ii) $HCHO \xrightarrow[2.\ H_2O]{1.\ CH_3MgBr} CH_3CH_2OH$ (iii) $C_6H_5OH + CH_3COOH \xrightarrow{H^+} C_6H_5OCOCH_3$ (or any other suitable method)	1 1 1 1 1 1
29	A: $(CH_3)_2C=CH_2$ B: $(CH_3)_2CBrCH_3$ C: $(CH_3)_3C-C(CH_3)_3$ D: $(CH_3)_2CHCH_2MgBr$ E: $(CH_3)_2CHCH_3$ F: $(CH_3)_2CHCH_2OC_2H_5$	½ X6

30	$\Delta T_f = iK_f m$ $0.068 = i \times 1.86 \times 0.01$ $i = 3.65$ or 3.656 $AlCl_3 \rightarrow Al^{3+} + 3\ Cl^-$ 1 0 0 1-α α 3α $\alpha = i-1/n-1$ $\alpha = .883$ or 0.885 88.3% or 88.5% (or any other suitable/ correct method)	½ ½ ½ ½ 1
31	(i) Deoxyribose sugar , Nitrogenous base and phosphoric acid (ii) Gluconic acid /  (iii) 2^o and 3^o structures are destroyed.	1 1 1
32	m=Z I t $2 = 63.5 \times 2 \times t/2 \times 96500$ t = 3039.4 s m_1/m_2 = eq wt $_1$/eq wt $_2$ $2 / m_2 = 63.5/2 \ / 65/2$ $m_2 = 2.05$ g (or any other suitable/ correct method)	½ ½ ½ ½ ½ ½
33	<table><tr><td>Lyophobic sol</td><td>Lyophilic sol</td></tr><tr><td>Interaction between dispersed phase and dispersion medium are weak</td><td>Interaction between dispersed phase and dispersion medium are strong</td></tr><tr><td>Unstable</td><td>stable</td></tr><tr><td>irreversible</td><td>reversible</td></tr><tr><td>Can easily be coagulated</td><td>Can't easily be coagulated</td></tr></table> (any three from above differences) (or any other suitable difference) **OR**	1 1 1
33	i) Lyophilic colloids have a unique property of protecting lyophobic colloids./ Lyophilic colloids form a layer around the lyophobic colloids to protect the lyophobic colloid from the electrolyte in order to prevent coagulation. ii) Potential difference between the fixed layer and the diffused layer of opposite charges of a colloid. iii) Substances used for stabilisation of an emulsion.	1 1 1
34	i) Aniline is a Lewis base and anhydrous $AlCl_3$ the catalyst is a Lewis acid which form a salt ii) Aryl halides do not undergo nucleophilic substitution with the anion formed by phthalimide. iii) Due to +I effect of alkyl group electron density on N increases.	1 1 1
	SECTION D	
35	a) (i) 3-hydroxy-3-phenylpropanal /  / $C_6H_5CH(OH)CH_2CHO$	1

	(ii) Phenyl hydrazone of benzaldehyde / $C_6H_5CH=N-NHC_6H_5$	1
	(iii)Sodium benzoate and benzyl alcohol /  and 	½+½
	b) (i) On heating with NaOH and I_2 : $CH_3CH=CHCOCH_3$ will form yellow ppt of CHI_3 while other compound doesn't .	1
	(ii) On adding $NaHCO_3$: Benzoic acid produces brisk effervescence while other compound doesn't. (or any other suitable chemical test)	1
35	**OR**	
	a) (i) $CH_3CH_2CH_3$	1
	(ii) C_6H_6	1
	(iii) $CH_2=CH-CH_2CHO$	1
	b) $C_6H_5COCH_3 < CH_3COCH_3 < CH_3CHO < HCHO$	1
	c) 	1
36	a) $k = (2.303 / t) \log ([A]_o / [A]_t)$	½
	$k = (2.303 / 40) \log (100 / 75)$	
	$= 0.007\ min^{-1}$ or $0.0071\ min^{-1}$ or $0.0072\ min^{-1}$	1
	$t = (2.303 / k) \log ([A]_o / [A]_t)$	
	$t = (2.303 / 0.0071) \log (100/20)$	½
	t =230 min or 226.7min or 223.7 min. (1/2 mark deducted for incorrect or no unit)	1
	b) Sum of powers of the concentration of the reactants in the rate law expression.	1
	When one of the reactant is present in large excess.	1
	OR	
36	a) $K_1 = 0.693/ t_{1/2} = 0.693 / 30 = 0.0231\ min^{-1}$	½
	$K_2 = 0.693/ t_{1/2} = 0.693 / 10 = 0.0693\ min^{-1}$	½
	$\log K_2/K_1 = E_a /2.303\ R\ (1/ T_1 - 1/ T_2)$	1
	$E_a = 2.303\ R \log K_2/K_1\ (T_1T_2/T_2-T_1)$	
	$= 2.303 \times 8.314 \log(0.0693/0.0231) \times (300X320/320-300)$	½
	$= 43848.5$ J/mol OR 43855 J/mol OR 43.8 kJ/mol	½
	b) Proper orientation	½
	Energy of the colliding particles should be more than threshold energy	½
	c) For a complex reaction, order of reaction is applicable while molecularity has no meaning.	1
37	a) i) Variable or multiple oxidation states / ability to form complexes / they provide large surface area for adsorption.	1
	ii) Similar size/similar properties	1
	iii)No unpaired electron/weak metallic bonding/ completely or fully filled d orbitals	1
	b) i) $2Na_2CrO_4 + 2\ H^+ \rightarrow Na_2Cr_2O_7 + 2\ Na^+ + H_2O$	1
	ii) $2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$	1
	(Balancing may be ignored in both above reactions)	
37	**OR**	
	a) i) Ti^{3+} has an unpaired electron while there are no unpaired electrons in Sc^{3+}.	1
	ii) Stable t_2g^3 of Cr^{3+} ion	1
	b) 1. Both show variable oxidation states	1

	2. Both show f-f transitions 3. Electrons of f-orbital in both show poor shielding effect 4. both have common +3 oxidation state 5. both show contraction in atomic radii. (any two suitable differences) c) $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$	1 1