

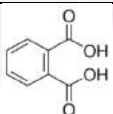
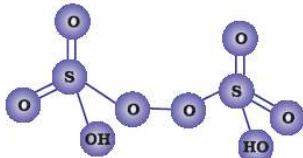
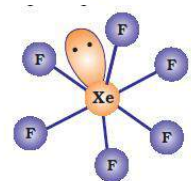
**CBSE Class 12 Chemistry Question Paper  
Solution 2020 Set 56/5/1**

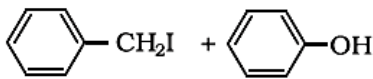
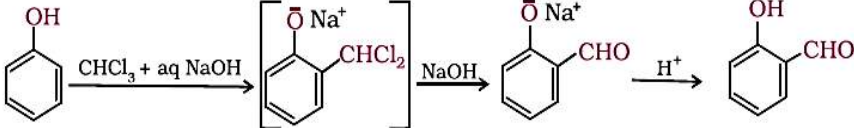
**Marking scheme – 2020**

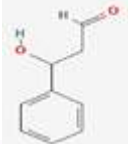
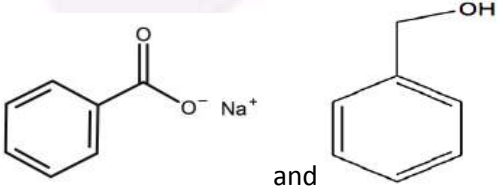
**CHEMISTRY (043) / CLASS XII**

**56/5/1**

Q.No	Expected Answer / Value Points	Marks
<b>SECTION A</b>		
1	By gaining one electron they acquire noble gas configuration/ smallest size and high effective nuclear charge in their respective period.	1
2	Extremely small size/ absence of d orbital/highest electronegativity / low bond dissociation enthalpy of F-F bond.	1
3	HI>HBr>HCl>HF	1
4	Low bond dissociation enthalpy and high hydration enthalpy.	1
5	X > X' / X is bigger in size and X' is smaller.	1
6	Mercury cell	1
7	5 F	1
8	k/2.303	1
9	Saccharine/Sucralose / alitame (any other except Aspartame)	1
10	Bakelite	1
11	(c)	1
12	(b)	1
13	(c)	1
14	(a)	1
15	One mark may be awarded to any option	1
16	(D)	1
17	(D)	1
18	(A)	1

19	(C)	1
20	(D)	1
<b>SECTION B</b>		
21	<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> </ul>	1 1
22	(i) NaCN acts as a leaching agent / it forms complex with gold/ $[\text{Ag}(\text{CN})_2]^-$ $4\text{Au} + 8\text{CN}^- + 2\text{H}_2\text{O} + \text{O}_2 \longrightarrow 4[\text{Au}(\text{CN})_2]^- + 4\text{OH}^-$ (Balancing may be ignored) (ii) CO acts as a reducing agent <b>OR</b>	1 1
22	<ul style="list-style-type: none"> <li>It is leached out using acid or bacteria</li> <li>Electrolytic refining</li> </ul>	1 1
23	<ul style="list-style-type: none"> <li>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)</li> <li>Adsorption of reactants occurs on surface of catalyst and reaction takes place.</li> </ul> <b>OR</b>	1+½ ½
23	<ul style="list-style-type: none"> <li>A state of continuous zig-zag motion of particles.</li> <li>Unbalanced bombardment of the particles by the molecules of the dispersion medium.</li> <li>The Brownian movement has a stirring effect which does not permit the particles to settle.</li> </ul>	1 ½ ½
24	(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
25	<ul style="list-style-type: none"> <li>Antiseptic is applied on living tissue, to kill or stop growth of microbes while disinfectant is applied on inanimate/ non -living objects</li> <li>0.2 per cent solution of phenol is an antiseptic while its one percent solution is disinfectant.</li> </ul>	1 1
26.	 (i) $\text{HOCH}_2\text{CH}_2\text{OH}$ and / ethylene glycol and phthalic acid / Ethane-1,2-diol and Benzene-1,2-dicarboxylic acid (ii) $\text{CH}_2=\text{CHCN}$ / Acrylonitrile / Propene nitrile	1 1
27	(i)  (ii) 	1 1

SECTION C										
28	$\Delta T_f = i K_f m$ $0.068 = i \times 1.86 \times 0.01$ $i = 3.65$ or $3.656$ $\alpha = i - 1/n - 1$ $\alpha = 0.883$ or $0.885$ $88.3\%$ or $88.5\%$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$  (or by any other correct method) 1								
29	$m = Z I t$ $2 = 63.5 \times 2 \times t / 2 \times 96500$ $t = 3039.4 \text{ s}$ $m_1 / m_2 = \text{eq wt}_1 / \text{eq wt}_2$ $2 / m_2 = 63.5 / 2 \quad / \quad 65 / 2$ $m_2 = 2.05 \text{ g}$	$\frac{1}{2}$  1 $\frac{1}{2}$  (or by any other correct method) 1 (deduct $\frac{1}{2}$ mark for incorrect or no unit)								
30	(i) Amylose is water soluble component of starch while amylopectin is insoluble in water (ii) Globular proteins are spherical in shape while fibrous are linear. (iii) Nucleoside consists of a sugar and a base When nucleoside is linked to phosphate group, it forms a nucleotide	1 1 1  (or any other suitable difference in each case)								
31	A: $(\text{CH}_3)_2 \text{C}=\text{CH}_2$ B: $(\text{CH}_3)_2 \text{CBrCH}_3$ C: $(\text{CH}_3)_3 \text{C}-\text{C}(\text{CH}_3)_3$ D: $(\text{CH}_3)_2 \text{CHCH}_2\text{MgBr}$ E: $(\text{CH}_3)_2 \text{CHCH}_3$ F: $(\text{CH}_3)_2 \text{CHCH}_2\text{OC}_2\text{H}_5$	$\frac{1}{2} \times 6$ $= 3$								
32	(i) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ (ii) $(\text{CH}_3)_2\text{C}=\text{CH}_2$ (iii)  OR	1 1  1								
32	(i)  (Intermediate compound in above equation may be ignored)	1  1								
	(ii) $\text{HCHO} \xrightarrow[2. \text{H}_2\text{O}]{1. \text{CH}_3\text{MgBr}} \text{CH}_3\text{CH}_2\text{OH}$	1								
	(iii) $\text{C}_6\text{H}_5\text{OH} + \text{CH}_3\text{COCl} \longrightarrow \text{C}_6\text{H}_5\text{OCOCH}_3$	1								
	(or by any other correct method)									
33	(i) Aniline forms salt with $\text{AlCl}_3$ , the Lewis acid. (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 atom increases.	1 1 1								
34	<table border="1"> <thead> <tr> <th>Lyophobic sol</th> <th>Lyophilic sol</th> </tr> </thead> <tbody> <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>irreversible</td> <td>reversible</td> </tr> <tr> <td>Can be easily coagulated</td> <td>Can't be easily coagulated</td> </tr> </tbody> </table>	Lyophobic sol	Lyophilic sol	Interaction between dispersed phase and dispersion medium are weak	Interaction between dispersed phase and dispersion medium are strong	irreversible	reversible	Can be easily coagulated	Can't be easily coagulated	     (or any other suitable difference)
Lyophobic sol	Lyophilic sol									
Interaction between dispersed phase and dispersion medium are weak	Interaction between dispersed phase and dispersion medium are strong									
irreversible	reversible									
Can be easily coagulated	Can't be easily coagulated									
		$1 \times 3 = 3$								

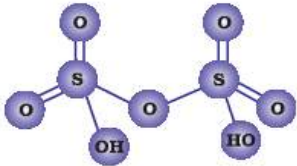
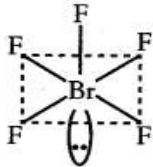
34	<p style="text-align: center;"><b>OR</b></p> <p>(i) Lyophilic colloids have a unique property of protecting lyophobic colloids./ Lyophilic colloids form a layer around the lyophobic colloids to protect them from the electrolyte or coagulation.</p> <p>(ii) Potential difference between the fixed layer and the diffused layer of opposite charges of a colloid.</p> <p>(iii) Substances used for stabilisation of an emulsion.</p>	1 1 1
<b>SECTION D</b>		
35	<p>a) i) Variable or multiple oxidation states / ability to form complexes / they provide large surface area for adsorption.</p> <p>ii) Similar size/similar properties</p> <p>iii) No unpaired electron/weak interatomic metallic bonding / completely or fully filled d orbitals</p> <p>b) i) <math>2\text{Na}_2\text{CrO}_4 + 2\text{H}^+ \rightarrow \text{Na}_2\text{Cr}_2\text{O}_7 + 2\text{Na}^+ + \text{H}_2\text{O}</math></p> <p>ii) <math>2\text{MnO}_2 + 4\text{KOH} + \text{O}_2 \rightarrow 2\text{K}_2\text{MnO}_4 + 2\text{H}_2\text{O}</math></p> <p style="text-align: center;"><b>(Balancing may be ignored in both above reactions)</b></p> <p style="text-align: center;"><b>OR</b></p> <p>a) i) <math>\text{Ti}^{3+}</math> has an unpaired electron while there are no unpaired electrons in <math>\text{Sc}^{3+}</math>.</p> <p>ii) Stable <math>t_2g^3</math> of <math>\text{Cr}^{3+}</math> ion</p> <p>b) 1. Both show variable oxidation states 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)</p> <p>c) <math>3\text{MnO}_4^{2-} + 4\text{H}^+ \rightarrow 2\text{MnO}_4^- + \text{MnO}_2 + 2\text{H}_2\text{O}</math></p>	1 1 1 1 1 1 1 1 1
36	<p>a) (i) 3-hydroxy-3-phenylpropanal /</p> <div style="text-align: center;">  <p style="margin-left: 100px;">/ <math>\text{C}_6\text{H}_5\text{CH}(\text{OH})\text{CH}_2\text{CHO}</math></p> </div> <p>(ii) Phenyl hydrazone of benzaldehyde / <math>\text{C}_6\text{H}_5\text{CH}=\text{N}-\text{NHC}_6\text{H}_5</math></p> <p>(iii) Sodium benzoate and benzyl alcohol /</p> <div style="text-align: center;">  <p style="margin-left: 100px;">and</p> </div> <p>b) (i) On heating with <math>\text{NaOH}</math> and <math>\text{I}_2</math> : <math>\text{CH}_3\text{CH}=\text{CHCOCH}_3</math> will form yellow ppt of <math>\text{CHI}_3</math> while other compound doesn't .</p> <p>(ii) On adding <math>\text{NaHCO}_3</math> : Benzoic acid produces brisk effervescence while other compound doesn't.</p> <p style="text-align: right;">(or any other suitable chemical test)</p> <p style="text-align: center;"><b>OR</b></p> <p>a) (i) <math>\text{CH}_3\text{CH}_2\text{CH}_3</math></p> <p>(ii) <math>\text{C}_6\text{H}_6</math></p> <p>(iii) <math>\text{CH}_2=\text{CH}-\text{CH}_2\text{CHO}</math></p> <p>b) <math>\text{C}_6\text{H}_5\text{COCH}_3 &lt; \text{CH}_3\text{COCH}_3 &lt; \text{CH}_3\text{CHO} &lt; \text{HCHO}</math></p>	1 1 $\frac{1}{2} + \frac{1}{2}$ 1 1 1

	<p>c)</p> $\text{CH}_3 - \text{CH} = \text{NNH} - \text{C}_6\text{H}_3(\text{NO}_2)_2$	1
37	<p>a) <math>k = (2.303 / t) \log ([A]_o / [A]_t)</math>  <math>k = (2.303 / 40) \log (100 / 75)</math>  <math>= 0.007 \text{ min}^{-1}</math> or <math>0.0071 \text{ min}^{-1}</math> or <math>0.0072 \text{ min}^{-1}</math>  <math>t = (2.303 / k) \log ([A]_o / [A]_t)</math>  <math>t = (2.303 / 0.0071) \log (100/20)</math>  <math>t = 230 \text{ min}</math> or <math>226.7 \text{ min}</math> or <math>223.7 \text{ min}</math>. (deduct ½ mark if incorrect or no unit)</p> <p>b) Sum of powers of the concentration of the reactants in the rate law expression.  When one of the reactant is present in large excess.</p> <p style="text-align: center;"><b>OR</b></p>	½ 1 ½ 1 1
37	<p>a) <math>k = 0.693 / t_{1/2}</math>  <math>k_1 = 0.693 / t_{1/2} = 0.693 / 30</math>  <math>k_2 = 0.693 / t_{1/2} = 0.693 / 10</math>  <math>\log k_2 / k_1 = E_a / 2.303 R (1 / T_1 - 1 / T_2)</math>  <math>\log 3 = E_a / 2.303 \times 8.314 (1 / 300 - 1 / 320)</math>  <math>E_a = 2.303 \times 8.314 \times 0.4771 \times (300 \times 320 / 20)</math>  <math>= 43848.5 \text{ J/mol}</math> OR <math>43855 \text{ J/mol}</math> or <math>43.8 \text{ kJ/mol}</math></p> <p>b) Proper orientation  Energy of the colliding particles should be more than threshold energy</p> <p>c) For a complex reaction, order of reaction is applicable while molecularity has no meaning.</p>	½ 1 1 1

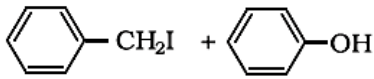
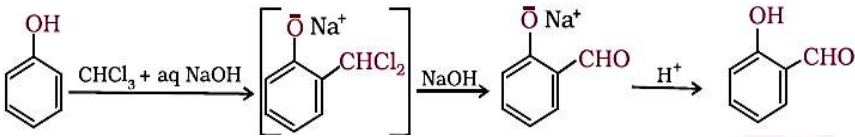
## Marking scheme – 2020

### CHEMISTRY (043)/ CLASS XII

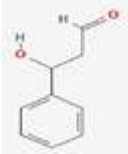
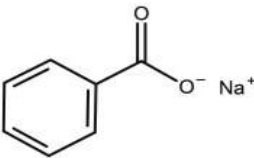
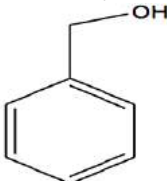
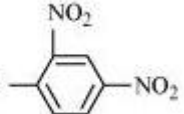
56/5/2

Q.No	Expected Answer / Value Points	Marks
<b>SECTION A</b>		
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	Benzylchloride / C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> Cl	1
7	N,N-dimethylaniline OR N,N-dimethylbenzenamine	1
8	Glycosidic linkage	1
9	Aspartame	1
10	Teflon/PTFE	1
11	(c)	1
12	(c)	1
13	(d)	1
14	(c)	1
15	(d)	1
16	(A)	1
17	(D)	1
18	(C)	1
19	(D)	1
20	(A)	1
<b>SECTION B</b>		
21	i) NaCN acts as a leaching agent / it forms complex with gold/ [Ag(CN) <sub>2</sub> ] <sup>-</sup> $4\text{Au} + 8\text{CN}^- + 2\text{H}_2\text{O} + \text{O}_2 \longrightarrow 4[\text{Au}(\text{CN})_2]^- + 4\text{OH}^-$ (Balancing may be ignored) ii) CO acts as a reducing agent	1 1
<b>OR</b>		
21	<ul style="list-style-type: none"> <li>It is leached out using acid or bacteria</li> <li>Electrolytic refining</li> </ul>	1 1
22	<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> </ul>	1 1
23	(i)  (ii) 	1 1

24	<ul style="list-style-type: none"> <li>The accumulation of molecular species at the surface rather than in the bulk of a solid or liquid e.g. adsorption of gases on surface of active charcoal (or any other suitable example)</li> <li>Adsorption of reactants occurs on surface of catalyst and reaction takes place.</li> </ul>	1+½ ½										
	<b>OR</b>											
24	<ul style="list-style-type: none"> <li>A state of continuous zig-zag motion of particles.</li> <li>Unbalanced bombardment of the particles by the molecules of the dispersion medium.</li> <li>The Brownian movement has a stirring effect which does not permit the particles to settle.</li> </ul>	1 ½ ½										
25	(i) Formaldehyde and phenol / HCHO and C <sub>6</sub> H <sub>5</sub> OH (ii) Adipic acid and hexamethylenediamine / HOOC (CH <sub>2</sub> ) <sub>4</sub> COOH and H <sub>2</sub> N (CH <sub>2</sub> ) <sub>6</sub> NH <sub>2</sub>	1 1										
26	2 marks to be given for attempting the question.	2										
27	<ul style="list-style-type: none"> <li>Antiseptic is applied on living tissue, to kill or stop growth of microbes while disinfectant is applied on inanimate/ non -living objects</li> </ul>	1										
	<ul style="list-style-type: none"> <li>0.2 per cent solution of phenol is an antiseptic while its one percent solution is disinfectant.</li> </ul>	1										
<b>SECTION C</b>												
28	A: (CH <sub>3</sub> ) <sub>2</sub> C=CH <sub>2</sub> B: (CH <sub>3</sub> ) <sub>2</sub> CBrCH <sub>3</sub> C: (CH <sub>3</sub> ) <sub>3</sub> C - C(CH <sub>3</sub> ) <sub>3</sub> D: (CH <sub>3</sub> ) <sub>2</sub> CHCH <sub>2</sub> MgBr      E: (CH <sub>3</sub> ) <sub>2</sub> CHCH <sub>3</sub> F: (CH <sub>3</sub> ) <sub>2</sub> CHCH <sub>2</sub> OC <sub>2</sub> H <sub>5</sub>	½ X 6										
29	$\Delta T_f = iK_f m$ $0.068 = i \times 1.86 \times 0.01$ $i = 3.65$ or 3.656 $AlCl_3 \rightarrow Al^{3+} + 3 Cl^-$ <table style="margin-left: 20px;"> <tr> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>1-α</td> <td>α</td> <td>3α</td> </tr> </table> $\alpha = i-1/n-1$ $\alpha = .883$ or 0.885 88.3% or 88.5%      (or any other suitable/ correct method)	1	0	0	1-α	α	3α	½ ½ ½  ½  1				
1	0	0										
1-α	α	3α										
30	a) Polysaccharides contain a large number of monosaccharide units joined together by glycosidic linkages./ carbohydrates which give a large number of monosaccharides on hydrolysis. Example: Starch / Cellulose / Glycogen b) Loss of biological activity of native form of protein when subjected to a change in temperature or pH./During denaturation 2° and 3° structures are destroyed. Example: Coagulation of egg white / Curdling of milk c) When the polypeptide chains run parallel and are held together by hydrogen and disulphide bonds, then fibre-like structure is formed. Example: Keratin / Myosin	½  ½ ½ ½ ½										
31	$m = Z I t$ $2 = 63.5 \times 2 \times t / 2 \times 96500$ $t = 3039.4$ 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 by any other correct method)	½ ½ ½ ½ ½ ½										
32	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Lyophobic sol</th> <th style="width: 50%;">Lyophilic sol</th> </tr> </thead> <tbody> <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> </tbody> </table> <div style="display: flex; justify-content: space-between;"> <span>(any three from above differences)</span> <span>(or any other suitable difference)</span> </div>	Lyophobic sol	Lyophilic sol	Interaction between dispersed phase and dispersion medium are weak	Interaction between dispersed phase and dispersion medium are strong	Unstable	stable	Irreversible	reversible	Can easily be coagulated	Can't easily be coagulated	1  1 1
Lyophobic sol	Lyophilic sol											
Interaction between dispersed phase and dispersion medium are weak	Interaction between dispersed phase and dispersion medium are strong											
Unstable	stable											
Irreversible	reversible											
Can easily be coagulated	Can't easily be coagulated											

32	<p style="text-align: center;"><b>OR</b></p> <p>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.</p> <p>ii) Potential difference between the fixed layer and the diffused layer of opposite charges of a colloid.</p> <p>iii) Substances used for stabilisation of an emulsion.</p>	1 1 1
33	<p>i) <math>\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}</math></p> <p>ii) <math>(\text{CH}_3)_2\text{C}=\text{CH}_2</math></p> <p>iii)</p> <div style="text-align: center;">  </div> <p style="text-align: center;"><b>OR</b></p> <p>(i) </p> <p style="text-align: center;">(Intermediate compound in above equation may be ignored)</p> <p>(ii) <math>\text{HCHO} \xrightarrow[2. \text{H}_2\text{O}]{1. \text{CH}_3\text{MgBr}} \text{CH}_3\text{CH}_2\text{OH}</math></p> <p>(iii) <math>\text{C}_6\text{H}_5\text{OH} + \text{CH}_3\text{COOH} \xrightarrow{\text{H}^+} \text{C}_6\text{H}_5\text{OCOCH}_3</math></p> <p style="text-align: right;">(or any other suitable method)</p>	1 1 1 1 1
34	<p>i) Aniline is a Lewis base and anhydrous <math>\text{AlCl}_3</math> the catalyst is a Lewis acid which form a salt</p> <p>ii) Aryl halides do not undergo nucleophilic substitution with the anion formed by phthalimide.</p> <p>iii) Due to +I effect of alkyl group electron density on N atom increases.</p>	1 1 1
35	<p>a) <math>k = (2.303 / t) \log (A_0 / A_t)</math>  <math>k = (2.303 / 40) \log (100 / 75)</math>  <math>= 0.007 \text{ min}^{-1}</math> or <math>0.0071 \text{ min}^{-1}</math> or <math>0.0072 \text{ min}^{-1}</math></p> <p><math>t = (2.303 / k) \log (A_0 / A_t)</math>  <math>t = (2.303 / 0.0071) \log (100/20)</math>  <math>t = 230 \text{ min}</math> or <math>226.7 \text{ min}</math> or <math>223.7 \text{ min}</math>. (deduct ½ mark if incorrect or no unit)</p> <p>b) Sum of powers of the concentration of the reactants in the rate law expression.  When one of the reactant is present in large excess.</p> <p style="text-align: center;"><b>OR</b></p> <p>a) <math>K_1 = 0.693 / t_{1/2} = 0.693 / 30 = 0.0231 \text{ min}^{-1}</math>  <math>K_2 = 0.693 / t_{1/2} = 0.693 / 10 = 0.0693 \text{ min}^{-1}</math>  <math>\log K_2 / K_1 = E_a / 2.303 R (1 / T_1 - 1 / T_2)</math>  <math>E_a = 2.303 R \log K_2 / K_1 ( T_1 T_2 / T_2 - T_1 )</math>  <math>= 2.303 \times 8.314 \log ( 0.0693 / 0.0231 ) \times ( 300 \times 320 / 320 - 300 )</math>  <math>= 43848.5 \text{ J/mol}</math> OR <math>43855 \text{ J/mol}</math> OR <math>43.8 \text{ kJ/mol}</math></p> <p>b) Proper orientation  Energy of the colliding particles should be more than threshold energy</p> <p>c) For a complex reaction, order of reaction is applicable while molecularity has no meaning.</p>	½ 1 ½ 1 1 ½ ½ ½ ½ 1
36	<p>a) i) Variable or multiple oxidation states / ability to form complexes / they provide large surface area for adsorption.</p> <p>ii) Similar size/similar properties</p> <p>iii) No unpaired electron/weak metallic bonding/ completely or fully filled d orbitals</p> <p>b) i) <math>2\text{Na}_2\text{CrO}_4 + 2 \text{H}^+ \rightarrow \text{Na}_2\text{Cr}_2\text{O}_7 + 2 \text{Na}^+ + \text{H}_2\text{O}</math></p> <p>ii) <math>2\text{MnO}_2 + 4\text{KOH} + \text{O}_2 \rightarrow 2\text{K}_2\text{MnO}_4 + 2\text{H}_2\text{O}</math></p>	1 1 1 1 1

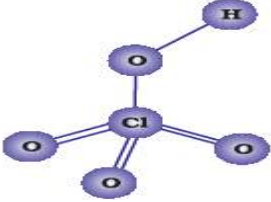
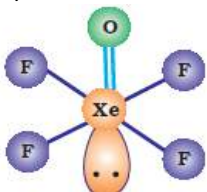


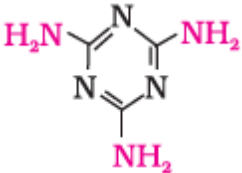
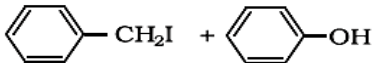
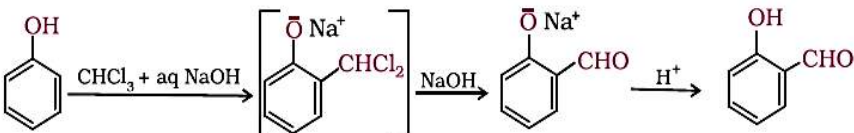
36	<p align="center"><b>(Balancing may be ignored in both above reactions)</b></p> <p align="center"><b>OR</b></p> <p>a) i) <math>Ti^{3+}</math> has an unpaired electron while there are no unpaired electrons in <math>Sc^{3+}</math>.  ii) Stable <math>t_2g^3</math> of <math>Cr^{3+}</math> ion</p> <p>b) 1. Both show variable oxidation states  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)</p> <p>c) <math>3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O</math></p>	<p align="right">1 1 1 1 1 1</p>
37	<p>a) (i) 3-hydroxy-3-phenylpropanal /</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">/ <math>C_6H_5CH(OH)CH_2CHO</math></div> </div> <p>(ii) Phenyl hydrazone of benzaldehyde /  <math>C_6H_5CH=N-NHC_6H_5</math></p> <p>(iii) Sodium benzoate and benzyl alcohol /</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;">  </div> <div style="margin: 0 20px;">and</div> <div style="text-align: center;">  </div> </div> <p>b) (i) On heating with NaOH and <math>I_2</math> : <math>CH_3CH=CHCOCH_3</math> will form yellow ppt of <math>CHI_3</math> while other compound doesn't .  (ii) On adding <math>NaHCO_3</math> : Benzoic acid produces brisk effervescence while other compound doesn't. (or any other suitable chemical test)</p> <p align="center"><b>OR</b></p> <p>a) (i) <math>CH_3CH_2CH_3</math>  (ii) <math>C_6H_6</math>  (iii) <math>CH_2=CH-CH_2CHO</math></p> <p>b) <math>C_6H_5COCH_3 &lt; CH_3COCH_3 &lt; CH_3CHO &lt; HCHO</math></p> <p>c)</p> <div style="display: flex; align-items: center;"> <math>CH_3-CH=NNH-</math>  </div>	<p align="right">1 1 <math>\frac{1}{2}+\frac{1}{2}</math> 1 1 1 1</p>

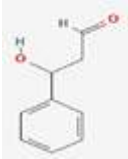
## Marking scheme – 2020

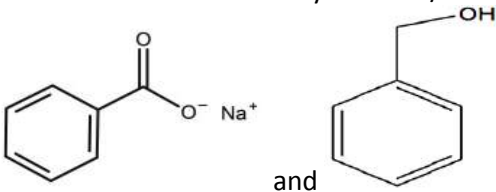
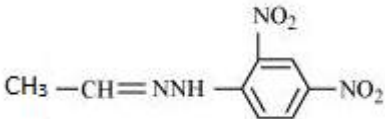
### CHEMISTRY (043)/ CLASS XII

56/5/3

Q.No	Expected Answer / Value Points	Marks
<b>SECTION A</b>		
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
<b>SECTION B</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.	$\frac{1}{2}$ $\frac{1}{2}$ 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	1 1
<b>OR</b>		

23	<ul style="list-style-type: none"> <li>It is leached out using acid or bacteria</li> <li>Electrolytic refining</li> </ul>	1 1
24	(i) Glycol and terephthalic acid / $\text{HOH}_2\text{C}-\text{CH}_2\text{OH}$ , $\text{HOOC}-\text{C}_6\text{H}_4-\text{COOH}$ (ii) Melamine and formaldehyde/  $\text{H}_2\text{N}$ , $\text{NH}_2$ , $\text{NH}_2$ , $\text{HCHO}$	$\frac{1}{2}+\frac{1}{2}$  $\frac{1}{2}+\frac{1}{2}$
25	<ul style="list-style-type: none"> <li>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)</li> <li>Adsorption of reactants occurs on surface of catalyst and reaction takes place.</li> </ul>	1+ $\frac{1}{2}$  $\frac{1}{2}$
25	<p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>A state of continuous zig-zag motion of particles.</li> <li>Unbalanced bombardment of the particles by the molecules of the dispersion medium.</li> <li>The Brownian movement has a stirring effect which does not permit the particles to settle.</li> </ul>	1 $\frac{1}{2}$ $\frac{1}{2}$
26	<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> </ul>	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.	$\frac{1}{2}$  $\frac{1}{2}$ $\frac{1}{2}$
<b>SECTION C</b>		
28	i) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ ii) $(\text{CH}_3)_2\text{C}=\text{CH}_2$ iii) 	1 1 1
28	<p style="text-align: center;"><b>OR</b></p> (i)  (Intermediate compound in above equation may be ignored) (ii) $\text{HCHO} \xrightarrow[2. \text{H}_2\text{O}]{1. \text{CH}_3\text{MgBr}} \text{CH}_3\text{CH}_2\text{OH}$ (iii) $\text{C}_6\text{H}_5\text{OH} + \text{CH}_3\text{COOH} \xrightarrow{\text{H}^+} \text{C}_6\text{H}_5\text{OCOCH}_3$ (or any other suitable method)	1  1 1
29	A: $(\text{CH}_3)_2\text{C}=\text{CH}_2$ B: $(\text{CH}_3)_2\text{CBrCH}_3$ C: $(\text{CH}_3)_3\text{C}-\text{C}(\text{CH}_3)_3$ D: $(\text{CH}_3)_2\text{CHCH}_2\text{MgBr}$ E: $(\text{CH}_3)_2\text{CHCH}_3$ F: $(\text{CH}_3)_2\text{CHCH}_2\text{OC}_2\text{H}_5$	$\frac{1}{2} \times 6$

30	$\Delta T_f = iK_f m$ $0.068 = i \times 1.86 \times 0.01$ $i = 3.65$ or $3.656$ $\text{AlCl}_3 \rightarrow \text{Al}^{3+} + 3 \text{Cl}^-$ $\begin{array}{ccc} 1 & 0 & 0 \\ 1-\alpha & \alpha & 3\alpha \end{array}$ $\alpha = i-1/n-1$ $\alpha = .883$ or $0.885$ $88.3\%$ or $88.5\%$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$  $\frac{1}{2}$  1										
31	(i) Deoxyribose sugar , Nitrogenous base and phosphoric acid (ii) Gluconic acid / $\begin{array}{c} \text{COOH} \\   \\ (\text{CHOH})_4 \\   \\ \text{CH}_2\text{OH} \end{array}$ (iii) $2^\circ$ and $3^\circ$ structures are destroyed.	1  1  1										
32	$m = Z I t$ $2 = 63.5 \times 2 \times t / 2 \times 96500$ $t = 3039.4 \text{ s}$ $m_1/m_2 = \text{eq wt}_1/\text{eq wt}_2$ $2 / m_2 = 63.5/2 / 65/2$ $m_2 = 2.05 \text{ g}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$										
33	<table border="1"> <thead> <tr> <th>Lyophobic sol</th> <th>Lyophilic sol</th> </tr> </thead> <tbody> <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> </tbody> </table> (any three from above differences)	Lyophobic sol	Lyophilic sol	Interaction between dispersed phase and dispersion medium are weak	Interaction between dispersed phase and dispersion medium are strong	Unstable	stable	irreversible	reversible	Can easily be coagulated	Can't easily be coagulated	1  1 1 1
Lyophobic sol	Lyophilic sol											
Interaction between dispersed phase and dispersion medium are weak	Interaction between dispersed phase and dispersion medium are strong											
Unstable	stable											
irreversible	reversible											
Can easily be coagulated	Can't easily be coagulated											
33	<p style="text-align: center;"><b>OR</b></p> 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 $\text{AlCl}_3$ 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										
<b>SECTION D</b>												
35	a) (i) 3-hydroxy-3-phenylpropanal /  $\text{C}_6\text{H}_5\text{CH}(\text{OH})\text{CH}_2\text{CHO}$	1										

	(ii) Phenyl hydrazone of benzaldehyde / $C_6H_5CH=N-NHC_6H_5$	1
	(iii) Sodium benzoate and benzyl alcohol / 	$\frac{1}{2} + \frac{1}{2}$
35	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. (ii) On adding $NaHCO_3$ : Benzoic acid produces brisk effervescence while other compound doesn't. <p style="text-align: right;">(or any other suitable chemical test)</p> <p style="text-align: center;"><b>OR</b></p> a) (i) $CH_3CH_2CH_3$ (ii) $C_6H_6$ (iii) $CH_2=CH-CH_2CHO$ b) $C_6H_5COCH_3 < CH_3COCH_3 < CH_3CHO < HCHO$	1 1 1 1
	c) 	1
36	a) $k = (2.303 / t) \log ([A]_0 / [A]_t)$ $k = (2.303 / 40) \log (100 / 75)$ $= 0.007 \text{ min}^{-1}$ or $0.0071 \text{ min}^{-1}$ or $0.0072 \text{ min}^{-1}$ $t = (2.303 / k) \log ([A]_0 / [A]_t)$ $t = (2.303 / 0.0071) \log (100/20)$ $t = 230 \text{ min}$ or $226.7 \text{ min}$ or $223.7 \text{ min}$ . (1/2 mark deducted for incorrect or no unit)	$\frac{1}{2}$ 1  $\frac{1}{2}$ 1
36	b) Sum of powers of the concentration of the reactants in the rate law expression. When one of the reactant is present in large excess. <p style="text-align: center;"><b>OR</b></p> a) $K_1 = 0.693 / t_{1/2} = 0.693 / 30 = 0.0231 \text{ min}^{-1}$ $K_2 = 0.693 / t_{1/2} = 0.693 / 10 = 0.0693 \text{ min}^{-1}$ $\log K_2 / K_1 = E_a / 2.303 R (1 / T_1 - 1 / T_2)$ $E_a = 2.303 R \log K_2 / K_1 ( T_1 T_2 / T_2 - T_1 )$ $= 2.303 \times 8.314 \log ( 0.0693 / 0.0231 ) \times ( 300 \times 320 / 320 - 300 )$ $= 43848.5 \text{ J/mol}$ OR $43855 \text{ J/mol}$ OR $43.8 \text{ kJ/mol}$	1 1 1 1 $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$
37	b) Proper orientation Energy of the colliding particles should be more than threshold energy	$\frac{1}{2}$ $\frac{1}{2}$
37	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. ii) Similar size/similar properties iii) No unpaired electron/weak metallic bonding/ completely or fully filled d orbitals b) i) $2Na_2CrO_4 + 2H^+ \rightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$ ii) $2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$ <b>(Balancing may be ignored in both above reactions)</b> <p style="text-align: center;"><b>OR</b></p> a) i) $Ti^{3+}$ has an unpaired electron while there are no unpaired electrons in $Sc^{3+}$ . ii) Stable $t_2g^3$ of $Cr^{3+}$ ion	1 1 1 1 1 1 1 1
	b) 1. Both show variable oxidation states	1

