Strictly Confidential: (For Internal and Restricted use only)
Senior School Certificate Examination-2020
Marking Scheme – CHEMISTRY
(SUBJECT CODE -043) (PAPER CODE – 56/5/1,2,3)

General Instructions: -

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully. **Evaluation is a 10-12 days mission for all of us. Hence, it is necessary that you put in your best efforts in this process.**
2. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them.**
3. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. Evaluators will mark(√) wherever answer is correct. For wrong answer 'X"be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
5. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
6. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
7. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
8. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
9. A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer deserves it.
10. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).
11. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
    - Leaving answer or part thereof unassessed in an answer book.
    - Giving more marks for an answer than assigned to it.
    - Wrong totaling of marks awarded on a reply.
    - Wrong transfer of marks from the inside pages of the answer book to the title page.
    - Wrong question wise totaling on the title page.
    - Wrong totaling of marks of the two columns on the title page.
    - Wrong grand total.
    - Marks in words and figures not tallying.
    - Wrong transfer of marks from the answer book to online award list.

- Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
- Half or a part of answer marked correct and the rest as wrong, but no marks awarded.

12. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.

13. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.

14. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.

15. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

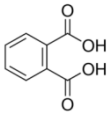
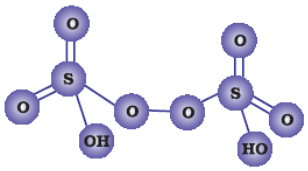
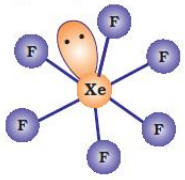
16. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

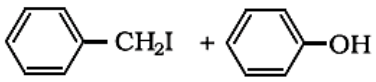
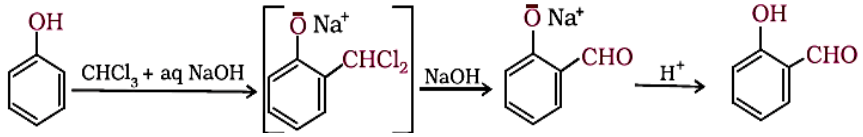
Marking scheme – 2020

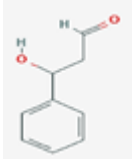
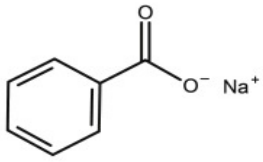
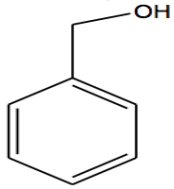
CHEMISTRY (043) / CLASS XII

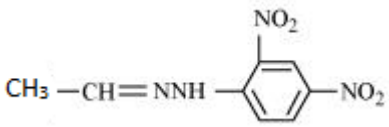
56/5/1

Q.No	Expected Answer / Value Points	Marks
	SECTION A	
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
	SECTION B	
21	• 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
22	(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** • It is leached out using acid or bacteria • Electrolytic refining	1 1 1 1
23	• 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
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	• Antiseptic is applied on living tissue, to kill or stop growth of microbes while disinfectant is applied on inanimate/ non -living objects • 0.2 per cent solution of phenol is an antiseptic while its one percent solution is disinfectant.	1 1
26.	(i)$HOCH_2CH_2OH$ and  / ethylene glycol and phthalic acid / Ethane-1,2-diol and Benzene-1, 2 -dicarboxylic acid (ii)CH_2=CHCN / Acrylonitrile / Propene nitrile	1 1
27 (i) (ii)	 	1 1

	SECTION C	
28	$\Delta T_f = iK_f m$ 0.068 = i x 1.86 x 0.01 i = 3.65 or 3.656 α = i-1/n-1 α = 0.883 or 0.885 88.3% or 88.5% (or by any other correct method)	½ ½ ½ ½ 1
29	m=Z I t 2 = 63.5 x 2 x t/2x96500 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) (deduct ½ mark for incorrect or no unit)	½ 1 ½ 1
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 (or any other suitable difference in each case)	1 1 1 1
31	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 =3
32	(i) $CH_3CH_2CH_2OH$ (ii) $(CH_3)_2C=CH_2$ (iii)  **OR**	1 1 1
32	(i)  (Intermediate compound in above equation may be ignored) (ii) $HCHO \xrightarrow[2.\ H_2O]{1.\ CH_3MgBr} CH_3CH_2OH$ (iii) $C_6H_5OH + CH_3COCl \longrightarrow C_6H_5OCOCH_3$ (or by any other correct method)	1 1 1
33	(i) Aniline forms salt with $AlCl_3$, 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><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>irreversible</td><td>reversible</td></tr><tr><td>Can be easily coagulated</td><td>Can't be easily coagulated</td></tr></table> (or any other suitable difference)	1x3=3

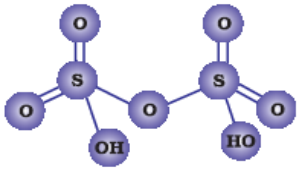
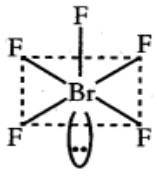
	OR	
34	(i) Lyophilic colloids have a unique property of protecting lyophobic colloids./ Lyophilic colloids form a layer around the lyophobic colloids to protect them from the electrolyte or coagulation.	1
	(ii) Potential difference between the fixed layer and the diffused layer of opposite charges of a colloid.	1
	(iii) Substances used for stabilisation of an emulsion.	1
	SECTION D	
35	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 interatomic metallic bonding / completely or fully filled d orbitals	1
		1
	b) i) $2Na_2CrO_4 + 2\ H^+ \rightarrow Na_2Cr_2O_7 + 2\ Na^+ + H_2O$	1
	ii) $2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$	
	(Balancing may be ignored in both above reactions)	
	OR	
	a) i) Ti^{3+} has an unpaired electron while there are no unpaired electrons in Sc^{3+}.	1
35	ii) Stable t_2g^3 of Cr^{3+} ion	1
	b) 1. Both show variable oxidation states	1
	2. Both show f-f transitions	1
	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
36	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.	1
	(or any other suitable chemical test)	
	OR	
36	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
37	a) $k = (2.303 / t) \log ([A]_o / [A]_t)$ $k = (2.303 / 40) \log (100 / 75)$ $= 0.007\ min^{-1}$ or $0.0071\ min^{-1}$ or $0.0072\ min^{-1}$ $t = (2.303 / k) \log ([A]_o / [A]_t)$ $t = (2.303 / 0.0071) \log (100/20)$ t =230 min or 226.7min or 223.7 min. (deduct ½ mark if incorrect or no unit) 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. **OR**	½ 1 ½ 1 1 1
37	a) $k = 0.693/ t_{1/2}$ $k_1 = 0.693/ t_{1/2} = 0.693 / 30$ $k_2 = 0.693/ t_{1/2} = 0.693 / 10$ $\log k_2/k_1 = E_a /2.303\ R\ (1/ T_1 - 1/ T_2)$ $\log 3 = E_a /2.303 \times 8.314\ (1/ 300 - 1/ 320)$ $E_a = 2.303 \times 8.314 \times 0.4771 \times (300 \times 320/20)$ = 43848.5 J/mol OR 43855 J/mol or 43.8 kJ/mol b) Proper orientation Energy of the colliding particles should be more than threshold energy c) For a complex reaction, order of reaction is applicable while molecularity has no meaning.	½ 1 ½ ½ 1

Marking scheme – 2020

CHEMISTRY (043)/ CLASS XII

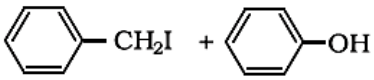
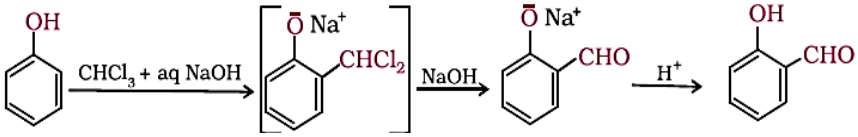
56/5/2

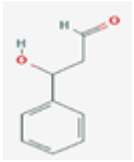
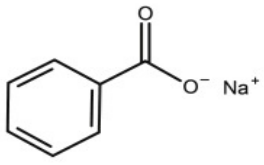
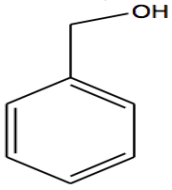
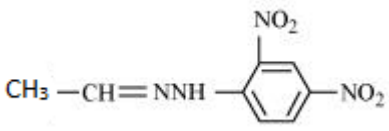
Q.No	Expected Answer / Value Points	Marks
	SECTION A	
1	By gaining one electron they acquire noble gas configuration	1
2	Extremely small size/ absence of d orbital/highest electronegativity	1
3	HI>HBr>HCl>HF	1
4	Low bond dissociation enthalpy and high hydration enthalpy	1
5	X >X'	1
6	Benzylchloride / $C_6H_5CH_2Cl$	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
	SECTION B	
21	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
	OR	
21	• It is leached out using acid or bacteria • Electrolytic refining	1 1
22	• 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
23	(i)  (ii) 	1 1

24	• 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) • Adsorption of reactants occurs on surface of catalyst and reaction takes place. **OR**	1+½ ½
24	• 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
25	(i) Formaldehyde and phenol / HCHO and C_6H_5OH (ii) Adipic acid and hexamethylenediamine / $HOOC(CH_2)_4COOH$ and $H_2N(CH_2)_6NH_2$	1 1
26	2 marks to be given for attempting the question.	2
27	• Antiseptic is applied on living tissue, to kill or stop growth of microbes while disinfectant is applied on inanimate/ non -living objects • 0.2 per cent solution of phenol is an antiseptic while its one percent solution is disinfectant.	1 1
	SECTION C	
28	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
29	$\Delta T_f = iK_f m$ $0.068 = i \times 1.86 \times 0.01$ $i = 3.65$ or 3.656 $AlCl_3 \rightarrow Al^{3+} + 3Cl^-$ 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
30	a) Polysaccharides contain a large number of monosaccharide units joined together by glycosidic linkages./ carbohydrates which give a large number of monosachharides 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^o and 3^o 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 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		

Lyophobic sol	Lyophilic sol	
Interaction between dispersed phase and dispersion medium are weak	Interaction between dispersed phase and dispersion medium are strong	1
Unstable	stable	1
Irreversible	reversible	1
Can easily be coagulated	Can't easily be coagulated	

(any three from above differences) (or any other suitable difference)

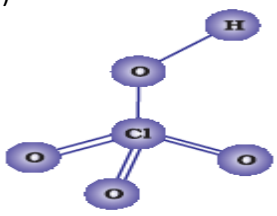
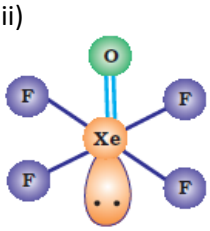
	OR	
32	i) Lyophilic colloids have a unique property of protecting lyophobic colloids./ Lyophilic colloids form a layer around the lyophobic colloids to protect the lyophobic colloid from the electrolyte in order to prevent coagulation.	1
	ii) Potential difference between the fixed layer and the diffused layer of opposite charges of a colloid.	1
	iii) Substances used for stabilisation of an emulsion.	1
33	i) $CH_3\ CH_2CH_2OH$	1
	ii) $(CH_3)_2C=CH_2$	1
	iii) 	1
	OR	
33	(i)  (Intermediate compound in above equation may be ignored)	1
	(ii) $HCHO \xrightarrow[2.\ H_2O]{1.\ CH_3MgBr} CH_3CH_2OH$	1
	(iii) $C_6H_5OH + CH_3COOH \xrightarrow{H^+} C_6H_5OCOCH_3$ (or any other suitable method)	1
34	i) Aniline is a Lewis base and anhydrous $AlCl_3$ the catalyst is a Lewis acid which form a salt	1
	ii) Aryl halides do not undergo nucleophilic substitution with the anion formed by phthalimide.	1
	iii) Due to +I effect of alkyl group electron density on N atom increases.	1
35	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. (deduct ½ mark if 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	
35	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
	$E_a = 2.303\ R \log K_2/K_1\ (T_1T_2/T_2-T_1)$	
	$= 2.303 \times 8.314 \log(0.0693/0.0231) \times (300\times320/320-300)$	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
36	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

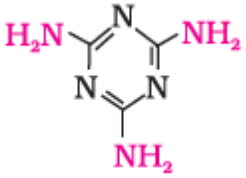
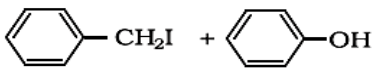
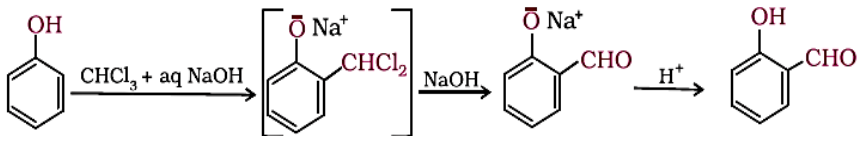
	(Balancing may be ignored in both above reactions) **OR**	
36	a) i) Ti^{3+} has an unpaired electron while there are no unpaired electrons in Sc^{3+}. ii) Stable t_2g^3 of Cr^{3+} ion	1 1
	b) 1. Both show variable oxidation states 2. Both show f-f transitions 3. Electrons of f-orbital in both show poor shielding effect 4. both have common +3 oxidation state 5. both show contraction in atomic radii. (any two suitable differences)	1 1
	c) $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$	1
37	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 . (ii) On adding $NaHCO_3$: Benzoic acid produces brisk effervescence while other compound doesn't. (or any other suitable chemical test)	1 1
	OR	
37	a) (i) $CH_3CH_2CH_3$ (ii) C_6H_6 (iii) $CH_2=CH-CH_2CHO$	1 1 1
	b) $C_6H_5COCH_3 < CH_3COCH_3 < CH_3CHO < HCHO$	1
	c) 	1

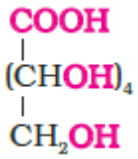
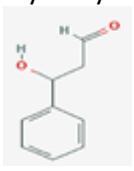
Marking scheme – 2020

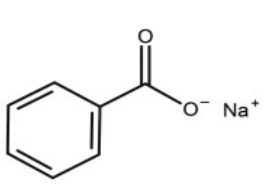
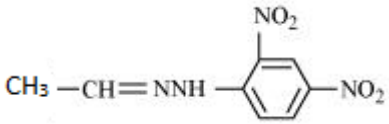
CHEMISTRY (043)/ CLASS XII

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