

**Strictly Confidential: (For Internal and Restricted use only)**

**Senior School Certificate Examination**

**March 2019**

**Marking Scheme – CHEMISTRY (SUBJECT CODE: 043)**

**(PAPER CODE – 56-1-3)**

**General Instructions: -**

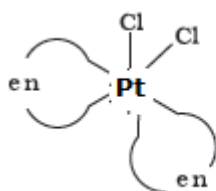
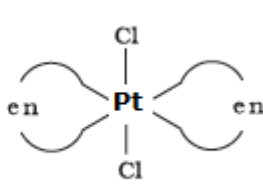
1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested 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. 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.
5. If a question does not have any parts, marks must be awarded in the left hand margin and encircled.
6. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
7. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
8. A full scale of marks **0-70** has to be used. Please do not hesitate to award full marks if the answer deserves it.
9. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 25 answer books per day.
10. 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 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.

11. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as (X) and awarded zero (0) Marks.
12. 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.
13. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
14. 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.
15. 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 – 2019

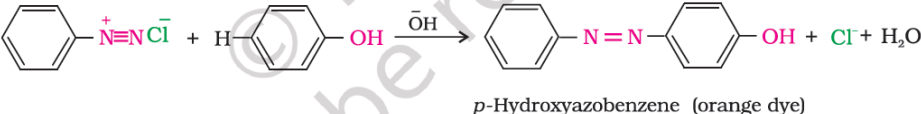
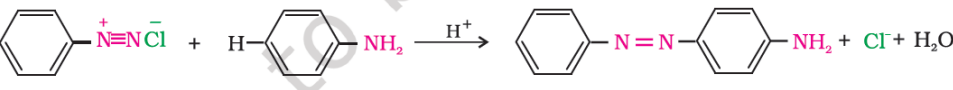
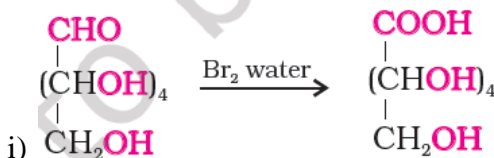
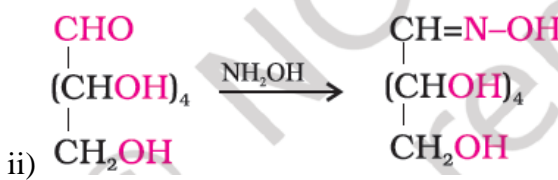
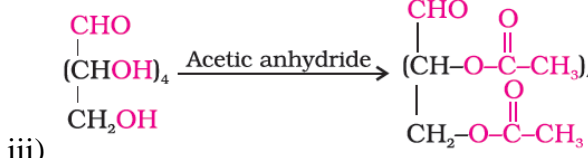
### CHEMISTRY (043)/ CLASS XII

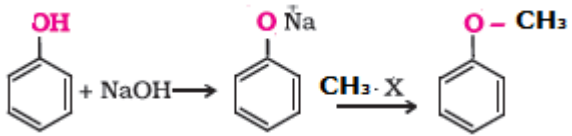
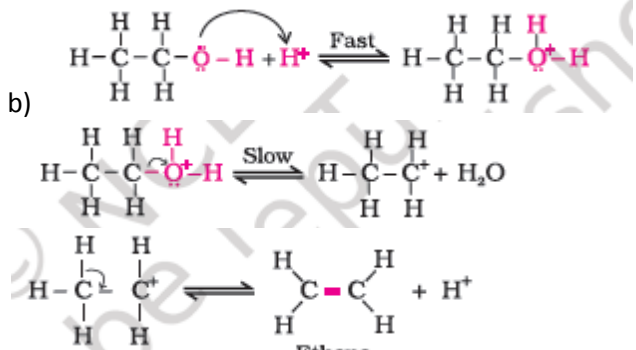
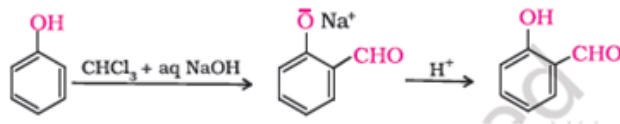
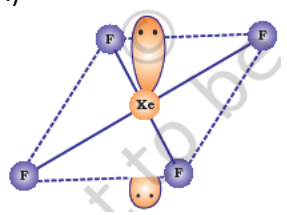
56/1/3

Q.No	Value Points	Marks				
SECTION A						
1	$\text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N}$	1				
2	Frenkel defect due to large difference in size of ions.	1				
3	<table><tr><td>SN1</td><td>SN2</td></tr><tr><td>Produces racemic mixture</td><td>Gives inversion of configuration</td></tr></table>	SN1	SN2	Produces racemic mixture	Gives inversion of configuration	
SN1	SN2					
Produces racemic mixture	Gives inversion of configuration					
4	Due to large surface area these are easily assimilated or adsorbed.	1				
OR						
4	Emulsion – both dispersed phase and dispersion medium are liquid Gel- Dispersed phase is liquid while dispersion medium is solid	1				
5	Glucose has aldehydic group while fructose has ketonic group/ Glucose is aldose while fructose is ketose.	1				
OR						
5	Glucose and Galactose	1				
SECTION B						
6	$\text{A} = \text{K}_2\text{MnO}_4 / \text{MnO}_4^{2-}$ , $\text{B} = \text{KMnO}_4 / \text{MnO}_4^-$ , $\text{C} = \text{IO}_3^-$ or $\text{KIO}_3$ , $\text{D} = \text{I}_2$	$\frac{1}{2} \times 4$				
7	Henry's law states that "the partial pressure of the gas in vapour phase ( $p$ ) is proportional to the mole fraction of the gas ( $x$ ) in the solution" <ul style="list-style-type: none"><li>To increase the solubility of <math>\text{CO}_2</math> in soft drinks</li><li>At high altitudes the partial pressure of oxygen is less than that at the ground level. This leads to low concentrations of oxygen in the blood and tissues of people living at high altitudes or climbers.</li><li>Scuba divers must cope with high concentrations of dissolved gases while breathing air at high pressure underwater. Increased pressure increases the solubility of atmospheric gases in blood. (Any two)</li></ul>	1       $\frac{1}{2}, \frac{1}{2}$				
8	Bis(ethan-1,2-diamine)dichloridoplatinum (II) <div></div> <div></div> <div>Cis    </div>					

	iii) Step 1	½
11	i) $sp^3d^2$ , Paramagnetic ii) $dsp^3$ / trigonal bipyramidal , Diamagnetic	½ , ½ ½ , ½
12	A= $CH_3CH_2CO-CH_3$ , B= $CH_3CH_2-CH(CH_3)-OH$ A= $C_6H_5CHO$ , B= $C_6H_5-CH=N-NH_2$	½ , ½ ½ , ½
SECTION C		
13	i) $C_6H_5-CH(OH)-CN$ ii) $2 CH_3COCH_2C_6H_5 + CdCl_2$ iii) $(CH_3)_2C(Br)COOH$	1 1 1
OR		
13	<p>i) <math>2CH_3-\overset{\text{O}}{\parallel}{C}-CH_3 \xrightleftharpoons{Ba(OH)_2} CH_3-\overset{\overset{CH_3}{ }}{\underset{\underset{OH}{ }}{C}}-CH_2-\overset{\text{O}}{\parallel}{C}-CH_3</math> Propanone (Ketol)</p> <p>ii) <math>\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{C}-CH_3 \xrightarrow[HCl]{Zn-Hg} \text{C}_6\text{H}_5-CH_2CH_3</math></p> <p>iii) <math>\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{C}-Cl \xrightarrow[Pd-BaSO_4]{H_2} \text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{C}-H</math></p>	1 1 1
14	i) Adsorption of toxic gases ii) Negative charge ; $Fe_2O_3 \cdot xH_2O / OH^-$ iii) Increases with increase in temperature/ First increases then decreases	1 ½ , ½ 1
15	$\Delta T_f = K_f m$ $K_f = \Delta T_f \times \frac{M_2 \times w_1}{w_2 \times 1000}$ $= \frac{2 \times 342 \times 96}{4 \times 1000}$ $= 16.4 \text{ K}$ $\Delta T_f = K_f m'$ $= K_f \frac{w_2 \times 1000}{M_2 \times w_1}$ $= \frac{16.4 \times 5 \times 1000}{95 \times 180}$ $= 4.8 \text{ K}$ $\Delta T_f = T_f^0 - T_f$ $4.8 = 273.15 - T_f$ $T_f = 268.35 \text{ K}$	½ 1 1 ½
16	$d = \frac{zm}{a^3 N}$ ; m=Mass of element , N=number of atoms $N = \frac{108 \times 4}{10.8 \times 27 \times 10^{-24}}$ $= 1.48 \times 10^{24} \text{ atoms}$	1 1 1

	<p>Or</p> $M = \frac{a^3 \times N_a \times d}{Z}$ $= \frac{27 \times 10^{-24} \times 6.022 \times 10^{23} \times 10.8}{4}$ $= 43.88 \text{ g mol}^{-1}$ <p>43.88 g mol<sup>-1</sup> contains <math>6.02 \times 10^{23}</math> atoms</p> <p>So, 108 g contains = <math>\frac{6.02 \times 10^{23} \times 108}{43.88} = 1.48 \times 10^{24}</math> atoms</p>	<p>½</p> <p>1</p> <p>½</p> <p>1</p>
17	<p>i) Nickel is heated in a stream of carbon monoxide forming a volatile complex named as nickel tetracarbonyl. This complex is decomposed at higher temperature to obtain pure metal.</p> <p>ii) ZnS is roasted to give ZnO which is heated with reducing agent coke to give Zn</p> <p>iii) Complex is treated with zinc, displacement reaction occurs to give pure Ag.</p>	<p>1</p> <p>1</p> <p>1</p>
18	<p>i) Due to presence of unpaired electrons / d-d transition.</p> <p>ii) Mn<sup>3+</sup> is 3d<sup>4</sup> while Cr<sup>3+</sup> is 3d<sup>3</sup> which in t<sub>2g</sub> half filled is extra stable.</p> <p>iii) The energy difference between 5f, 6d and 7s orbitals is very less as compared to lanthanoids.</p>	
19.	<p>i) Tranquilizers</p> <p>ii) Anionic detergents</p> <p>iii) It is difficult to control the sweetness.</p>	<p>1</p> <p>1</p> <p>1</p>
	OR	
19	<p>i) Antibiotics which kill or inhibit a wide range of Gram-positive and Gram-negative bacteria. Example- Chloramphenicol (or any other)</p> <p>ii) The chemicals which either kill or prevent the growth of microorganisms when applied to inanimate objects such as floors, drainage system, instruments, etc. Example – 1% Phenol solution (or any other)</p> <p>iii) Cationic detergents are quaternary ammonium salts of amines with acetates, chlorides or bromides as anions where Cationic part is involved in cleansing action. Example – Cetyltrimethylammonium bromide (or any other)</p>	<p>½, ½</p> <p>½, ½</p> <p>½, ½</p>
20.	<p>i) <math>\text{HOOC}(\text{CH}_2)_4\text{COOH}</math>, <math>\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2</math></p> <p>ii) <math>\text{HO}-\text{CH}_2-\text{CH}_2-\text{OH}</math>, </p> <p>iii) <math>\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2</math>, </p>	<p>1 × 3</p>
	OR	
20.	<p>i) Homopolymers, single repeating unit</p> <p></p> <p>ii) <math>\text{NH}_2</math>, <math>\text{HCHO}</math> (Or names of monomers)</p> <p>iii) Sulphur forms cross links at the reactive sites of double bonds and thus the rubber gets stiffened / To improve the physical properties of rubber by forming cross links.</p>	<p>½, ½</p> <p>1</p> <p>1</p>
21	<p>i) <math>(\text{CH}_3)_3\text{C-I}</math>, Due to large size of iodine / better leaving group / Due to lower electronegativity.</p> <p></p> <p>ii)</p> <p>iii) Because enantiomers have same boiling points / same physical properties.</p>	<p>½, ½</p> <p>1</p> <p>1</p>

22	<p> <math display="block">\text{C}_6\text{H}_5-\ddot{\text{N}}-\text{H} + \text{CH}_3-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{O}-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{CH}_3 \longrightarrow \text{C}_6\text{H}_5-\ddot{\text{N}}-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{CH}_3 + \text{CH}_3\text{COOH}</math> </p> <p>i) </p> <p>ii) </p> <p>iii) <math display="block">\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}</math></p> <p style="text-align: right;">Any one</p>	1
23	$t = \frac{[R]_0 - [R]t}{k}$ $= \frac{[0.1 - 0.064]}{4 \times 10^{-3}}$ $= 9 \text{ s}$	1 1 1
24	<p>i) Carbohydrates that yield two to ten monosaccharide units, on hydrolysis, are called oligosaccharides. Example- Sucrose or any other.</p> <p>ii) When a protein in its native form, is subjected to physical change like change in temperature or chemical change like change in pH, the hydrogen bonds are disturbed. Due to this, globules unfold and helix get uncoiled and protein loses its biological activity. Example- Boiling of egg.</p> <p>iii) Organic compounds required in the diet in small amounts to perform specific biological functions for normal maintenance of optimum growth and health of the organism. Example- Vitamin A</p> <p style="text-align: right;">(Or any other correct example)</p>	1 1 1
	OR	
24	<p>i) </p> <p>ii) </p> <p>iii) </p>	1 1 1
	SECTION D	

25	<p>  </p> <p>a) i)</p> <p>ii) <math>\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{PCC, Heat}} \text{CH}_3\text{-CHO} \xrightarrow{\text{i)CH}_3\text{MgBr ii)H}^+} \text{CH}_3\text{CH(OH)-CH}_3</math> (or any other correct method)</p> <p>b)</p> <p>  </p> <p>c) Due to involvement of lone pair of oxygen in delocalisation makes the benzene ring electron rich.</p>	<p>1</p> <p>1</p> <p>½</p> <p>½</p> <p>1</p> <p>1</p>
	OR	
25	<p>a) i) <i>o</i>-Nitrophenol is steam volatile due to intramolecular hydrogen bonding while <i>p</i>-nitrophenol is less volatile due to intermolecular hydrogen bonding.</p> <p>ii) Due to the formation of stable intermediate tertiary carbocation / <math>\text{CH}_3\text{O}^-</math> being a strong base favours elimination reaction.</p> <p>  </p> <p>b) i)</p> <p>ii) (Award 1 mark if attempted in any way)</p> <p>c) Add neutral <math>\text{FeCl}_3</math> to both the compounds, phenol will give violet colouration while ethanol does not.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
26	<p>a) i) In vapour state sulphur partly exists as <math>\text{S}_2</math> molecule which has two unpaired electrons like <math>\text{O}_2</math>.</p> <p>ii) Due to greater interelectronic repulsion</p> <p>iii) Because decomposition of ozone into oxygen results in the liberation of heat (<math>\Delta H</math> is negative) and an increase in entropy (<math>\Delta S</math> is positive), resulting in large negative Gibbs energy change (<math>\Delta G</math>) for its conversion into oxygen.</p> <p>b) i) NO gas/ Nitric oxide</p> <p>ii) <math>\text{NO}_2</math> gas / Nitrogen dioxide</p>	<p>1</p> <p>1</p> <p>1</p> <p>1,1</p>
	OR	
26	<p>a) i) <math>4\text{H}_3\text{PO}_3 \rightarrow 3\text{H}_3\text{PO}_4 + \text{PH}_3</math></p> <p>  </p> <p>ii)</p> <p>b) i) Due to small size and low bond dissociation enthalpy</p> <p>ii) As the size increases, electronegativity decreases / non-metallic character decreases</p> <p>c) <math>5\text{SO}_2 + 2\text{MnO}_4^- + 2\text{H}_2\text{O} \rightarrow 5\text{SO}_4^{2-} + 4\text{H}^+ + 2\text{Mn}^{2+}</math></p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

27	$E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.059}{n} \log K_c$ $= E^{\circ}_{\text{cell}} - \frac{0.059}{2} \log \frac{10^{-3}}{10^{-2}}$ $= 2.71 + 0.0295$ $E_{\text{cell}} = 2.7395 \text{ V}$ <p>i) Cu to Mg / Cathode to anode / Same direction  ii) Mg to Cu / Anode to cathode / Opposite direction</p>	1 1 1 1 1
	OR	
27	<p>(a) <math>m = z I t</math></p> $2.8 \text{ g} = \frac{56 \times 2 \times t}{2 \times 96500}$ $t = 4825 \text{ s} / 80.417 \text{ min}$ $\frac{m_1}{m_2} = \frac{E_1}{E_2}$ $\frac{2.8}{m_{\text{Zn}}} = \frac{56}{2} \times \frac{2}{65.3}$ $m_{\text{Zn}} = 3.265 \text{ g}$ <p>b) i) A- strong electrolyte , B-Weak electrolyte  ii) <math>\Lambda^{\circ}m</math> for weak electrolytes cannot be obtained by extrapolation while <math>\Lambda^{\circ}m</math> for strong electrolytes can be obtained as intercept.</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 1 1