# Marking scheme Compartment – 2019

# CHEMISTRY (043)/ CLASS XII

# 56(B)

| Q.No | Value Points | Marks |
|---|---|---|
| | SECTION A | |
| 1 | $XY_3$ | 1 |
| | OR | |
| 1 | $X_4Y_3$ | |
| 2 | 2 | 1 |
| | OR | |
| 2 | Square planar | |
| 3 | Because of difference in number of unpaired electron | 1 |
| 4 | Because the carboxyl group gets bonded to the catalyst anhy.$AlCl_3$ | 1 |
| 5 | Ascorbic acid , Scurvy (bleeding of gums) | ½ , ½ |
| | SECTION B | |
| 6 | i) It has high vapour pressure in the bottle, so it is cooled to lower the vapour pressure otherwise it will escape rapidly.<br>ii) Solubility of $O_2$ in water decreases by increasing temperature . | 1<br><br>1 |
| 7 | $t=\frac{2.303}{k}\log\frac{[A]o}{[A]}$ $t_{3/4}=\frac{2.303}{k}\log\frac{[A]o}{3/4[A]}$<br><br>$t_{3/4}=\frac{2.303}{2.54\times10^{-3}}\log 4 = \frac{2.303}{2.54\times10^{-3}}\ 2\times 0.3010$<br><br>$t_{3/4} = 5.46\times10^{2}$ s | ½<br><br>1<br><br>½ |
| | OR | |
| 7 | $t=\frac{2.303}{k}\log\frac{[A]o}{[A]}$<br>$t_{1/2}=\frac{0.693}{k}$ , k = 0.693/ 30 = 0.0231 $min^{-1}$<br><br>$t_{90\%} = \frac{2.303}{0.0231}\log\frac{100}{100-90}$ = 99.7 min | ½<br>½<br><br>1 |
| 8 | <table><tr><td></td><td>Dispersed Phase</td><td>Dispersion Medium</td></tr><tr><td>i)Cheese</td><td>Liquid</td><td>Solid</td></tr><tr><td>ii)Paints</td><td>Solid</td><td>Liquid</td></tr></table> | 1<br>1 |
| 9 | $AlCl_3$<br>$As_2S_3$ is a –ve sol, hence $Al^{3+}$ ions will be more effective / Due to higher charge of $Al^{3+}$ | 1<br>1 |
| | OR | |
| 9 | i) Due to continuous unbalanced bombardment / Zig-zag motion of particles by the molecules of dispersion medium, it does not allow the particles to settle down.<br>ii) Coagulation of +ve charged colloidal particles in animal hides takes place by –vely charged colloidal particles in tannin which results in hardening of leather / Due to mutual coagulation of oppositely charged ions | 1<br><br>1 |
| 10. | | |

*These answers are meant to be used by evaluators

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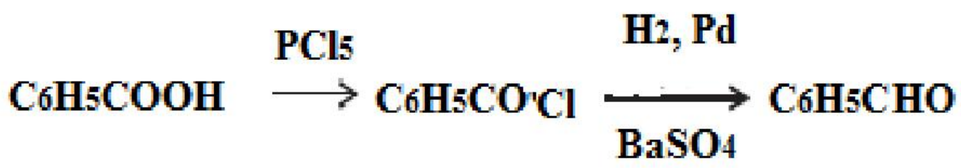
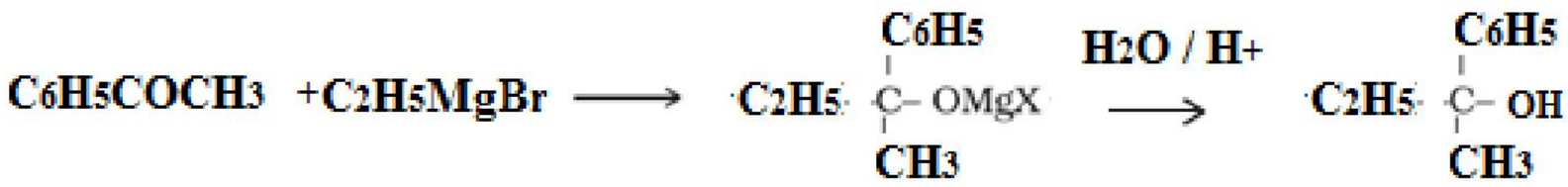
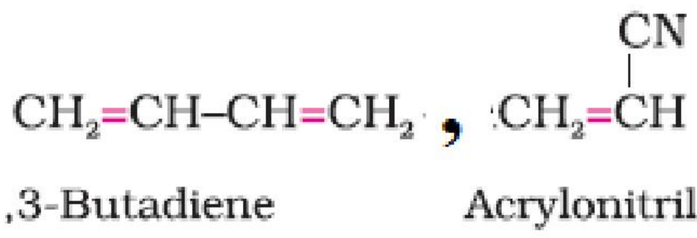
| | a)<br>  <br>1<br>  <br>1<br>b)<br>(Or any other suitable method) | |
| 11 | i) $C_6H_5OH + HCHO$ , phenol and formaldehyde<br>  <br>1,3-Butadiene Acrylonitrile<br>ii) | ½ , ½<br>½ , ½ |
| 12 | i)Fibre ii)Elastomer iii)Thermoplastic polymer iv)Thermosetting polymer | ½ ×4 |
| | SECTION C | |
| 13 | $2.5 \times 10^{24}$ atoms weigh = 250 g<br>$6.022 \times 10^{23}$ atoms weigh = $\frac{250 \times 6.022 \times 10^{23}}{2.5 \times 10^{24}}$<br>d= $\frac{zM}{a^3 N_A}$ = 2 × $\frac{250 \times 6.022 \times 10^{23}}{2.5 \times 10^{24}}$ / $[(400 \times 10^{-10})^3 \times 6.022 \times 10^{23}]$<br>d=3.125 g $cm^{-3}$ | 1<br>½ + ½<br>1 |
| | OR | |
| 13 | $a^3 = (400 \times 10^{-10} cm)^3 = 64 \times 10^{-24}$ $cm^3$<br>d= $\frac{zm}{a^3 N}$<br>N = $\frac{4 \times 280}{64 \times 10^{-24} \times 7}$<br>= $2.5 \times 10^{24}$ atoms | ½<br>½<br>1<br>1 |
| 14 | $\Delta T_f$ = i $K_f$ m ; i=3 for $CaCl_2$<br>$\Delta T_f$ = i $K_f$ × $\frac{w_B \times 1000}{M_B \times w_A}$<br>2= 3 × 1.86 × $\frac{w_B \times 1000}{111 \times 500}$<br>$w_B$ = $\frac{2 \times 111 \times 500}{3 \times 1.86 \times 1000}$<br>$w_B$ =19.89 g | ½ , ½<br>1<br>1 |
| 15 | i) The activation energy for the combustion of fuel is generally very high which is not available at room temperature.<br>ii) Because of larger surface area of powdered wood in comparison to a log of wood.<br>iii) The pressure inside the pressure cooker is independent of atmospheric pressure | 1<br>1<br>1 |
| 16 | a) I*mpure* metal when heated with iodine forms a volatile iodide complex which is further heated at higher temperature to give pure metal. eg: Zr/Ti<br>b)The ore particles are wetted by oil whereas the impurities are wetted by water. eg: sulphide ores | 1, ½<br>1, ½ |
| | OR | |
| 16 | a) Zinc is more electropositive than copper , therefore zinc displaces silver from its solution easily.<br>b) The melting point of alumina is very high, so it is dissolved which lowers the m.p and brings | 1<br>1 |

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| | conductivity.<br>c) reduction of ZnO by carbon is spontaneous because ΔG is –ve whereas with CO , ΔG is +ve hence the process is non spontaneous. | 1 |
| 17 | A= white phosphorous<br>B= Red phosphorous<br>C= $PH_3$<br>D= $PCl_5$<br>E= $H_3PO_4$ | 1<br>½<br>½<br>½<br>½ |
| 18 | a) X-X' bond in interhalogen is weaker than X-X bond in pure halogens<br>b) High bond dissociation energy / Due to the presence of triple covalent bond<br>c) Because bond dissociation enthalpy decreases from $NH_3$ to $BiH_3$ | 1<br>1<br>1 |
| 19. | a) i)$K_2[NiCl_4]$<br>ii) $[Co(NH_3)_5]_2 (SO_4)_3$<br>b) The orbital splitting energies are not sufficiently large for forcing pairing | 1<br>1<br>1 |
| 20. | a)Due to stability of benzyl carbocation / resonance stabilisation of carbocation<br>b) Rotation due to one enantiomer is cancelled by another enantiomer.<br>c) Nitro group acts as electron withdrawing group / -I effect | 1<br>1<br>1 |
| | OR | |
| 20 | a) Due to dominance of resonance effect over inductive effect<br>b) Due to polar nature of alkyl halides<br>c) They are highly reactive and reacts with water / moisture to form hydrocarbon | 1<br>1<br>1 |
| 21 | A= $(CH_3CO)_2O$<br>B= $CH_3COOH$ C= $CH_3COOC_2H_5$ D= $C_2H_5OH$ E= $CH_3COCH_3$ | 1<br>½ ×4 |
| 22 | A= $C_6H_5CONH_2$<br>B= $C_6H_5N_2^+Cl^-$ C= $C_6H_6$ D= $C_6H_5NC$ E= $C_6H_5I$ | 1<br>½ ×4 |
| 23 | a) The two cyclic hemiacetal forms of glucose that differ only in the configuration of the hydroxyl group at C1<br>b) When a protein in its native form, is subjected to physical change like change in temperature or chemical change like change in pH , protein loses its biological activity.<br>c) Base + Sugar + Phosphoric acid | 1<br>1<br>1 |
| 24 | a) Bithional b)Broad spectrum antibiotics c)Sodium benzoate | 1,1,1 |
| | OR | |
| 24 | a) Chemical compounds which stop overproduction of acid in stomach.<br>b) Antiseptics – chemicals applied on living tissues to prevent the growth of microorganisms<br>c) It is needed by diabetic persons as it is excreated from the body in urine unchanged. / Reduces calories intake | 1<br>1<br>1 |
| | SECTION D | |
| 25 | a)<br>$\log Kc = \frac{n\,E^0_{cell}}{0.059}$<br>$= \frac{2 \times 0.236}{0.059}$ = 8.0<br><br>$\Delta_r G^0$ = - n F $E^0_{cell}$<br>= 2 × 96500 $C\,mol^{-1}$ × 0.2364<br>$\Delta_r G^0$ = - 45548 J $mol^{-1}$ = -45.548 KJ $mol^{-1}$<br>b) Fuel cell - Galvanic cells that are designed to convert the energy of combustion of fuels like hydrogen, methane, methanol, etc. directly into electrical energy<br>Advantages : High efficiency and eco-friendly / pollution free | ½<br>1<br><br>½<br>1<br>1<br>½ , ½ |
| | OR | |



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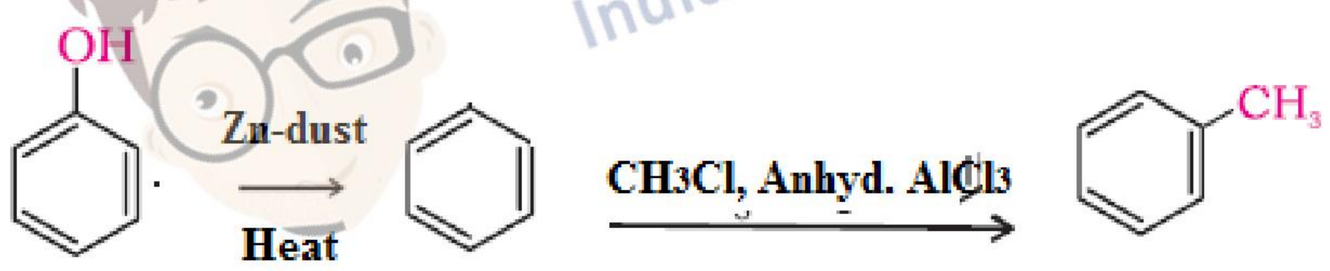
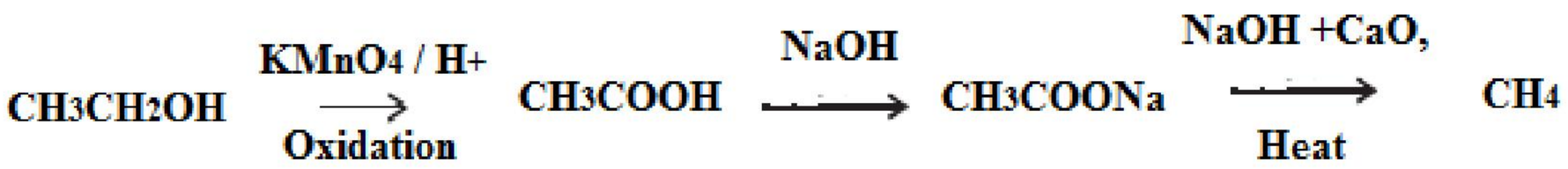
| 25 | a)<br>Cell constant ( G*) = conductivity × Resistance<br>= 1.29 S $m^{-1}$ × 100 ohm = 129 $m^{-1}$ = 1.29 $cm^{-1}$<br>Conductivity of 0.02 mol $L^{-1}$ KCl = G* / Resistance = 129 $m^{-1}$ / 520 ohm = 0.248 S $m^{-1}$<br>= 0.248 × $10^{-2}$ S $m^{-1}$<br>$\Lambda_m = \frac{k}{cmc} = \frac{0.248 \times 10^{-2}\ S\ m^{-1}}{0.02\ mol\ L^{-1}} \times 1000\ cm^3\ L^{-1}$<br>= 124 S $cm^2$ $mol^{-1}$<br>b)<br>Anode: $Zn(Hg) + 2OH^- \longrightarrow ZnO(s) + H_2O + 2e^-$<br>Cathode: $HgO + H_2O + 2e^- \longrightarrow Hg(l) + 2OH^-$ | 1<br><br>1<br><br>1<br><br>1<br>1 |
| 26 | a) Because in $Fe^{2+}$ the electronic force of attraction between its nucleus and outer electrons cloud is stronger than $Mn^{2+}$ due to increase in number of protons.<br>b) The chromium metal–metal interactions are strong due to presence of 6 unpaired electrons whereas in mercury there are no unpaired electrons.<br>c) Because Co(III) in octahedral field has extremely stable $t_2g^6\ e_g^0$ configuration after pairing of 6 electrons.<br>d) Because $KMnO_4$ oxidises HCl to $Cl_2$<br>e) $H_2S$ is oxidised by $K_2Cr_2O_7$ to colloidal sulphur which appears milky white or pale yellow. | 1<br><br>1<br><br>1<br><br>1<br>1 |
| | OR | |
| 26 | a) $Ti^{3+}$ $(3d^1)$ , $V^{3+}$ $(3d^2)$ , $Mn^{2+}$ $(3d^5)$ , $Fe^{3+}$ $(3d^5)$ , $Co^{2+}$ $(3d^7)$<br>Because they all have incompletely filled d-orbitals<br>b) i) $5S^{2-} + 2MnO^-_4 + 16H^+ \longrightarrow 2Mn^{2+} + 8H_2O + 5S$<br>ii) $5Fe^{2+} + MnO_4^- + 8H^+ \longrightarrow Mn^{2+} + 4H_2O + 5Fe^{3+}$ | ½ ×6<br><br>1<br><br>1 |
| 27 | a) i)<br>  <br><br>ii)<br>  <br><br>(Or any other correct method)<br>b) i)Heat both the compounds with $I_2$ and NaOH, ethanol gives yellow ppt of iodoform.<br>ii) Add neutral $FeCl_3$ to both the compounds, p-methyl phenol gives green-voilet complex.<br>c)Pent-1-en-3-ol | 1<br><br>1<br><br>1<br><br>1<br>1 |
| | OR | |
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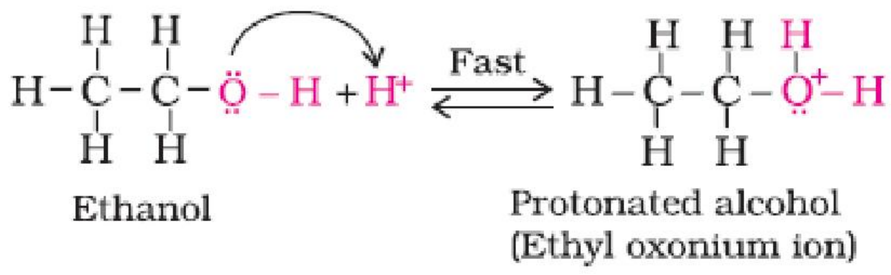
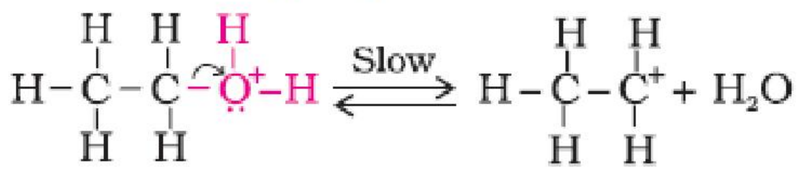
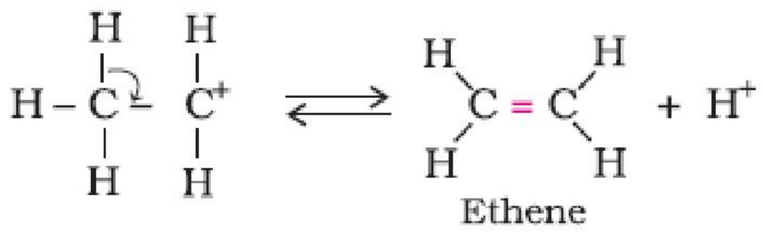
| 27 | a)<br>*Step 1:* Formation of protonated alcohol.<br>  <br><br>*Step 2:* Formation of carbocation: It is the slowest step and hence, the rate determining step of the reaction.<br>  <br><br>*Step 3:* Formation of ethene by elimination of a proton.<br>  <br> | 1<br><br>1<br><br>1 |
| | b) i) Due to resonance , C-O bond in phenol acquires a partial double bond character . In ethanol resonance is not possible. / Due to $sp^2$ hybridised carbon of C-O bond in phenol<br>ii) Because of hydrogen bonding in ethyl alcohol. | 1<br><br>1 |



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