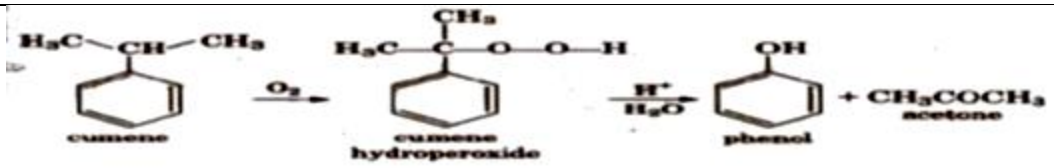
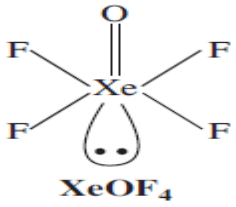
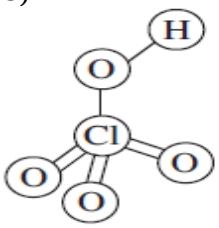
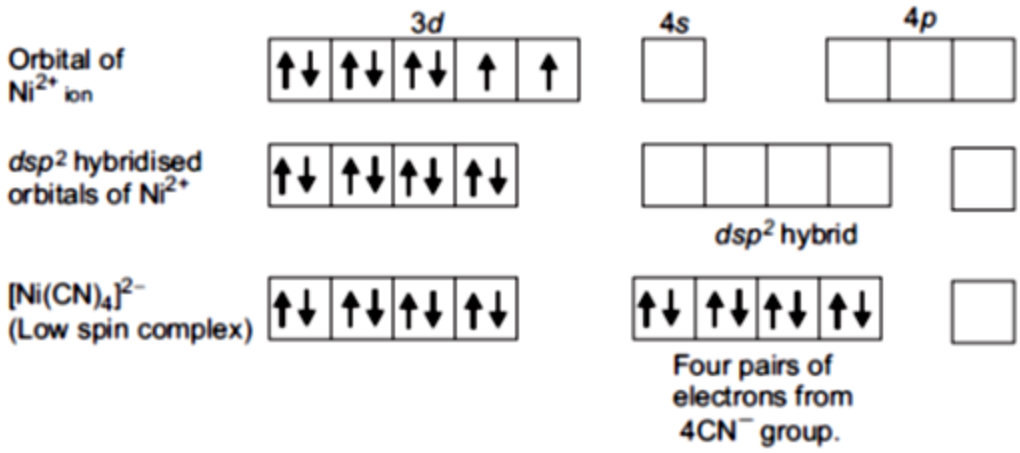
COMMON PRE-BOARD EXAMINATION 2017-2018

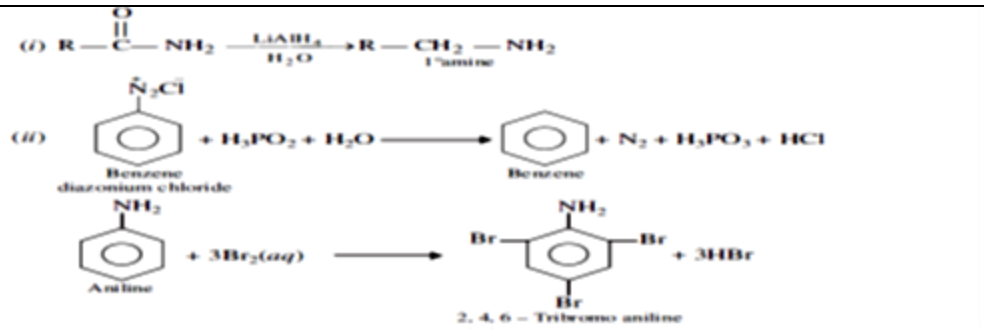
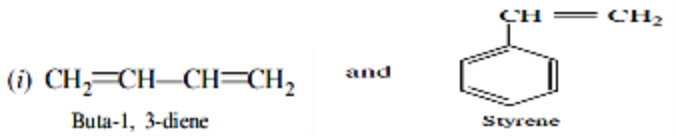
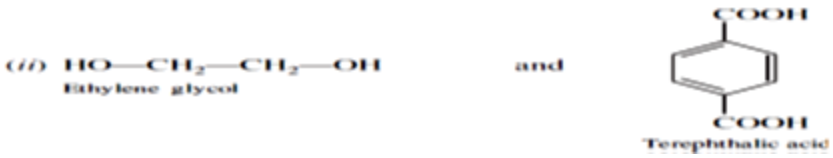
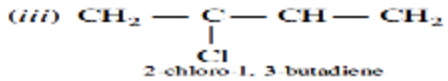
CHEMISTRY- CLASS XII
ANSWER KEY - SET – 2-VALUE POINTS

1	The energy gap between valance band and conduction is known as forbidden zone.	1
2	The residual forces at the surface decreases resulting in the decrease of surface energy which appears as heat.	1
3	2-Bromobutane.	1
4	NO_2 contains odd number of electrons, on dimerization it is converted into stable N_2O_4 molecules with even no. of electrons.	1
5		1
6	*a*) Van't Hoff factor: May be defined as the ratio of normal molecular mass to observed molecular mass or the ratio of observed colligative property to calculated colligative property.(any correct definition) (*b*) It states that for a solution of volatile liquids the partial vapour pressure of each component in the solution is directly proportional to its mole faction.	1 1
7	a) The reaction that takes place in a single step b) Second order OR Rate = $k[R]^2$ (*i*) If [R] is doubled, Rate = $k[2R]^2 = 4k[R]^2$ = 4 times (*ii*) If [R] is reduced to $\frac{[R]}{2}$, Rate = $k\left[\frac{R}{2}\right]^2 = \frac{1}{4}k[R]^2 = \frac{1}{4}$th	1 1 ½ ½ ½ ½
8	a)  $XeOF_4$ b) 	1+ 1

9	 Structure: Square planar. **Magnetic behaviour:** Diamagnetic due to the absence of unpaired electrons.	½ ½ ½ ½
10	a) Heat with chloroform and KOH- methylamine gives foul smell/ With Hinseberg's reagent methylamine gives ppt soluble in alkali. b) **Intermolecular association is more in primary and secondary amines as there are hydrogen atoms available for hydrogen bond formation.** Tertiary amines do not have intermolecular association due to the absence of hydrogen atom available for hydrogen bond formation.	1 1
11	For *fcc*, $a = 2\sqrt{2}r$ $\therefore \quad a = 2\sqrt{2} \times 127.8 \text{ pm} = 361.4 \text{ pm} = 361.4 \times 10^{-10} \text{ cm}$ Here, $z = 4$; $M = 63.55 \text{ g mol}^{-1}$; $a = 3.614 \times 10^{-8}$ cm; $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$ Substituting the values in the expression, $d = \frac{z \times M}{a^3 \times N_A}$, we get $d = \frac{4 \times 63.55 \text{ g mol}^{-1}}{(3.614 \times 10^{-8} \text{ cm})^3 \times 6.02 \times 10^{23} \text{ mol}^{-1}} = 8.95 \text{ g cm}^{-3}$	½ ½ ½ ½ 1
12	$i = 2$, Substituting these values in the expression, $W_B = \frac{\Delta T_f \times M_B \times W_A}{i \times K_f \times 1000}$ $W_B = \frac{2 \text{ K} \times 74.5 \text{ g mol}^{-1} \times 1000 \text{ g}}{2 \times 1.86 \text{ K kg mol}^{-1} \times 1000 \text{ g kg}^{-1}} = 40.05 \text{ g}$	½ ½ 2

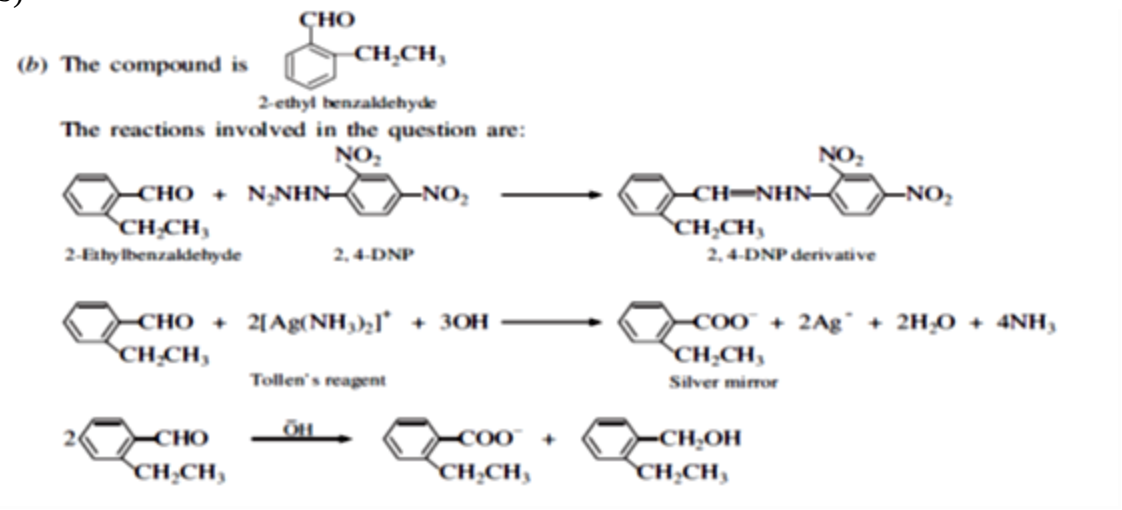
13	$t_{1/2} = 5730$ years $\therefore \quad K = \frac{0.693}{t_{1/2}} = \frac{0.693}{5730} = 1.209 \times 10^{-4}$ year^{-1} $t = \frac{2.303}{K} \log \frac{[R]_0}{[R]} = \frac{2.303}{1.2 \times 10^{-4}} \log \frac{100}{80}$ $t = \frac{2.303 \times 10^4}{1.209} (\log 10 - \log 8) = \frac{2.303 \times 10^4}{1.209} (1 - 3 \log 2)$ $t = \frac{2.303}{1.209} \times 10^4 \ (1 - 3 \times 0.3010) = \frac{2.303 \times 0.097 \times 10^4}{1.209}$ $t = 1847.7$ years (Accept 1845 years)	*1* *½* *½* *1*
14	**Multimolecular colloids:** In this type of colloids, colloidal particles are aggregates of atoms or molecules each having size less than 1nm, e.g., sulphur sol, gold sol.(1/2 +1/2) **Macromolecular colloids:** In this type of colloids, colloidal particles are themselves large moleculesof colloidal dimensions, e.g., starch, proteins, polyethene, etc. (1/2 +1/2) **Associated colloids:** There are certain substances which at low concentrations behave as normal electrolyte, but at higher concentrations exhibit colloidal behaviour due to the formation of aggregates. Such colloids are known as associated colloids.	*1*
15	(*i*) The principle of froth floatation process is that sulphide ore particle are preferentially wetted by pine oil, whereas the gangue particles are wetted by water. (*ii*) Zone refining is based on the principle that the impurities are more soluble in (liquid state) than in the solid state of the metal. (*iii*) The principle of refining by liquation is that the impurities whose melting points are higher than the metal are left behind on melting the impure metal. Hence pure metal separates out. OR (*i*) Role of NaCN in the extraction of gold is to do the leaching of gold ore in the presence of air from which the gold is obtained later by replacement. $4Au(s) + 8NaCN(aq) + 2H_2O + O_2 \longrightarrow 4Na[Au(CN)_2] + 4KOH$ (*ii*) SiO_2 is added to copper matte to remove FeO (into slag) $FeO + SiO2 \longrightarrow FeSiO3$ (Slag) (*iii*) Iodine is heated with impure Zr to form volatile compound which on further heating decomposes to give pure zirconium. Zr (Impure) + I_2 $\rightarrow ZrI_4 \rightarrow$ Zr (pure) + $2I_2$	*1* *1* *1* *½* *½* *1* *1*

16	a) (*i*) $6NaOH \underset{\text{(hot and conc)}}{} + 3Cl_2 \longrightarrow 5NaCl + NaClO_3 + 3H_2O$ (*ii*) $XeF_4 + O_2F_2 \longrightarrow XeF_6 + O_2$ b) In vapour phase sulphur partly exists as S_2 molecules and has 2 unpaired electrons in antibonding π^*orbitals.	*1* *1* *1*
17	A= $[Ni(NH_3)_6]^{2+}/[Ni(NH_3)_6]Cl_2$ B= $[Ni(NH_3)_4(en)]^{2+}$ C= $[Ni(NH_3)_2(en)_2]^{2+}$ D = $[Ni(en)_3]^{2+}$ Each ½ mark C= Diamminebis(ethane-1,2-diamine)Nickel(II)---1	
18	a) (i) $CH_3-CH_2-\ddot{O}-H + H^+ \longrightarrow CH_3-CH_2-\overset{H}{\overset{|}{\ddot{O}}}-H$ (ii) $CH_3CH_2-\ddot{O}: + CH_3-CH_2-\overset{+}{O}(H)(H) \rightarrow CH_3CH_2-\overset{+}{\underset{H}{O}}-CH_2CH_3 + H_2O$ (iii) $CH_3CH_2-\overset{+}{\underset{H}{O}}-CH_2CH_3 \longrightarrow CH_3CH_2-O-CH_2CH_3 + H^+$ b) $CH_3CH_2Br + CH_3CH_2ONa \longrightarrow CH_3CH_2OCH_2CH_3 + NaBr$ (or any other example)	½ *1* ½ *1*
19	i) CH_3Cl, CH_3Br, CH_2Br_2, $CHBr_3$ ii) $(C_6H_5)_2C(CH_3)Br$, $(C_6H_5)_2CHBr$, $C_6H_5CH(CH_3)Br$, $C_6H_5CH_2Br$ **b)** Oxidation of $CHCl_3$ in the presences of light gives poisonous gas phosgene (carbonyl chloride). $2CHCl_3 + O_2 \xrightarrow{\text{Light}} \underset{\text{phosgene}}{2COCl_2} + 2HCl$	*1* *1* ½ ½

20		*1* *1* *1*
21	i) 1. In DNA molecules, the sugar moiety is β-D-2-deoxyribose whereas in RNA molecule, it is β-D-ribose. 2. DNA contains four bases viz. adenine (A), guanine (G), cytosine (C) and thymine (T). RNA also contains four bases, the first three bases are same as in DNA but the fourth one is uracil (U). 3. DNA has double strand helix structure but in secondary structure of RNA, only single stranded. **4.**DNA is exclusively responsible for maintaining the identity of different species of organisms over millionsof years. The proteins are synthesised by various RNA molecules **Any two each ½ mark=1** ii) Xerophalmia , souces; fish liver oil, carrots, butter and milk(any one) ---1/2+1/2=1 iii) α-D-Glucose and β-D- fructose--1	
22	**i)**  **ii)**  **iii)** 	*1* *1* *1*
23	**i)** Caring/ helping the people---1 ii) Tranquilizers example: valium / barbiturates/ **chlorodiazepoxide** or any other example---1/2 + ½ iii) **Dettol** is a mixture of **Chloroxylenol** and **Terpinol-----1**	

	iv) Antibiotics which kill or inhibit the growth of Gram-positive or Gram-negative bacteria are **narrow spectrum antibiotics----------1**	
24	**a)** The lead storage battery is a secondary cell The cell reactions when the battery is in use are given below At anode : $Pb(s) + SO_4^{2-}(aq) \longrightarrow PbSO_4(s) + 2e^-$ At cathode : $PbO_2(s) + SO_4^{2-}(aq) + 4H^+(aq) + 2e^- \longrightarrow PbSO_4(s) + 2H_2O(l)$ Overall cell reaction : $Pb(s) + PbO_2(s) + 2H_2SO_4(aq) \longrightarrow 2PbSO_4(s) + 2H_2O(l)$ **b) Zn(s)/ Zn^{2+}(aq) //Ag^+(aq) /Ag(s)** **i) Zn is negatively charged** ii) Cathode : $2Ag^+(aq) + 2e- \longrightarrow 2Ag(s)$ Anode: $Zn(s) \longrightarrow Zn^{2+} + 2e-$ **OR** **a) Conductivity:** It is the conductance of one unit volume of solution kept between two platinum electrodes with unit area of cross section and at a distance of unit length. Molar conductivity: It can be defined as the conductance of the electrolytic solution kept between the electrodes of a conductivity cell at unit distance but having area of cross section large enough to accommodate sufficient volume of solution that contains one mole of the electrolyte. Conductivity decreases with decrease in concentration both, for weak and strong electrolytes but molar conductivity increases with decrease in concentration.---(1/2+1/2) b) Galvanic cells that are designed to convert the energy of combustion of fuels like hydrogen, methane, methanol, etc. directly into electrical energy are called **fuel cells.** Cathode: $O_2(g) + 2H_2O(l) + 4e^- \longrightarrow 4OH^-(aq)$ Anode: $2H_2(g) + 4OH^-(aq) \longrightarrow 4H_2O(l) + 4e^-$ 1/2+1/2)	½ ½ ½ ½ *1* *1* ½ ½ *1* *1* 1
25	**a)** **i)** carboxyl group is deactivating and the catalyst aluminium chloride (Lewis acid) gets bonded to the carboxyl group. **ii)** Due to presence of three methyl groups, the nucleophilic attack does not occur due to steric hindrance in 2, 4, 6-trimethyl cylcohexanone.	*1* *1*

b)



1

$C_9H_{10}O + (O) \longrightarrow C_6H_5COOH$

4 reactions each ½ mark(Only main product enough)

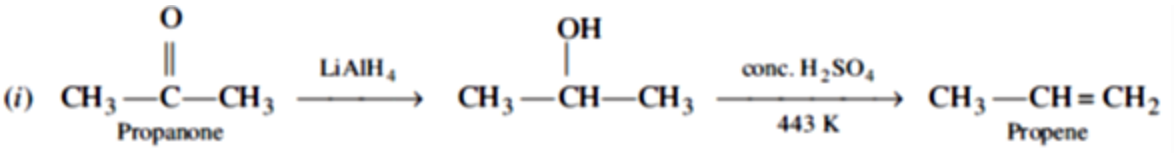
OR

a)

i) Add NaOH and iodine ethanal gives yellow ppt 1

ii) Add Sodium bicarbonate/ sodium carbonate benzoic acid give effervescence. 1

b



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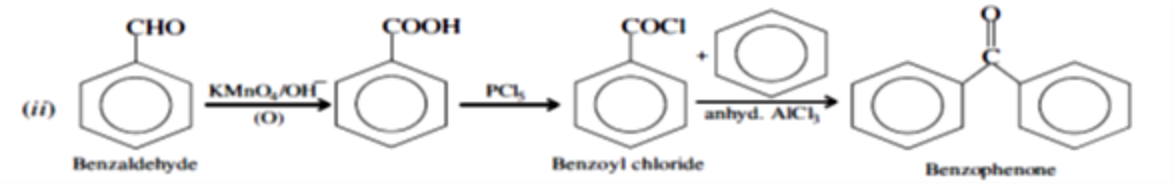

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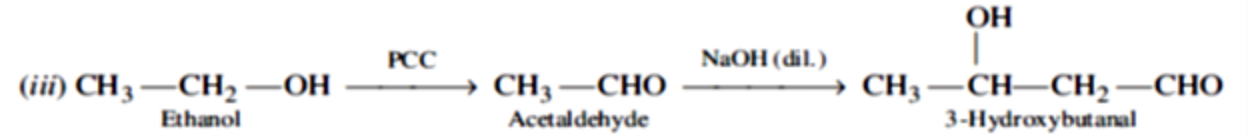

1

26 **a)**

i This is due to comparable energy between 5*f*, 6*d* and 7s orbitals in the actinoid series. *1*

ii) Cr^{2+} is reducing as its configuration changes from d^4 to d^3, a more stable half-filled t_2g3 configuration while Mn^{3+} is oxidising as Mn^{3+} to Mn^{2+}results a more stable half-filled d^5 configuration. *1*

iii) Because of their ability to form variable oxidation states and to form complexes. *1*

b)

i) $2MnO_4^- + 5NO_2^- + 6H^+ \longrightarrow 2Mn^{2+} + 5NO_3^- + 3H_2O$

ii) $Cr_2O_7^{2-} + 2OH^- \longrightarrow 2CrO_4^{2-} + H_2O$

[corrected balanced equation I mark each. Unbalanced but correct products ½ mark each]

OR

a)

i) The decrease in metallic radius coupled with increase in mass. *1*

ii) They do not have unpaired electrons in **f orbital** *1*

b)

A— MnO_2 /Manganese dioxide

B--- K_2MnO_4/ potassium manganate.

C--- $KMnO_4$ / potassium permanganate---each ½ mark

$2\ MnO_2 + 4KOH + O_2 \longrightarrow 2\ K_2MnO_4 + 2H_2O$---- 1/2

Potassium manganate.

$3\ MnO_4^{2-} + 4H^+ \longrightarrow 2MnO_4^- + MnO_2 + 2H_2O$ ---- 1/2

Disproportionation------ 1/2

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