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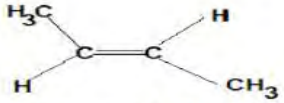
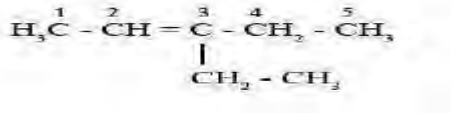
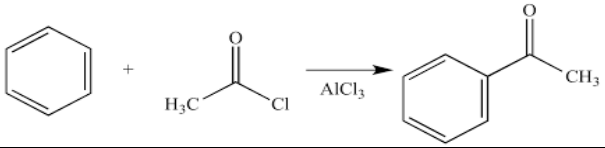
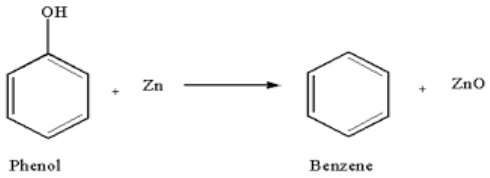
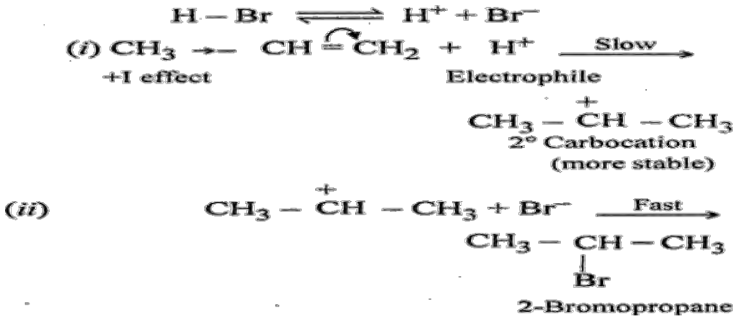
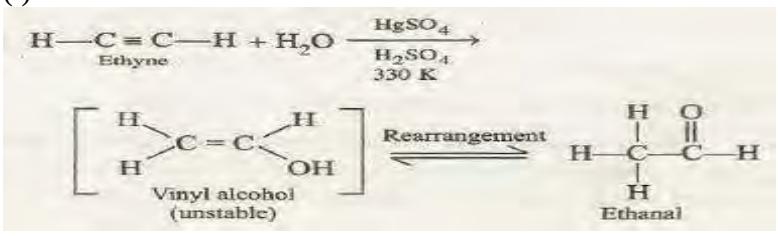
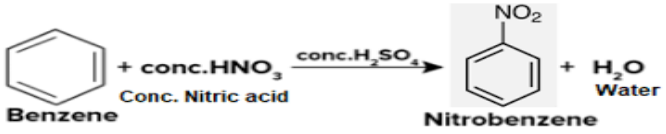
SESSION ENDING EXAMINATION (2023-24)
CLASS-XI
SUBJECT: CHEMISTRY
MARKING SCHEME

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
B	C	A	C	A	D	C	D	B	B	B	B	A	D	A	A

17	Molar mass of MnO_2 =55 +32 = 87 g. Molar mass of 4 moles of HCl = 4 x 36.5 = 146g. So, mass of HCl will react with 5.0g of MnO2 = 146 /87 x 5 = 8.40g.1	1 1
18	$\lambda = 580\ nm = 580 \times 10^{-9}\ m$. Frequency, $\nu = c / \lambda = 3.0 \times 10^{8}\ m/s\ /\ 580 \times 10^{-9}\ m = 5.17 \times 10^{14}\ s^{-1}$. Wave number, $(\bar{\nu}) = 1 / \lambda = 1 / 580 \times 10^{-9}\ m = 1.72 \times 10^{6}\ m^{-1}$.	1 1
19	Hybridisation is sp^3d. Shape – Trigonal bipyramidal Because, Axial bonds experience more repulsion than equatorial bonds. Or No. of bonds formed between two atoms is called bond order. Bond order = ½ (B.e - A.B.e) Bond order of O_2^+ = 1/2(B.e - A.B.e) = 1/2 (8-3) =2.5	1 1 1 1
20	For given reaction, $\Delta ng = 2- (3) = -1$ $\Delta H^0 = \Delta U^0 + \Delta ng\ RT$ = -10.5Kj + (-1) (8.314 x 10^{-3}Kj) (298) = -10.5 – 2.48 = -12.98Kj $\Delta G^0 = \Delta H^0 - T\Delta S^0$ = -12.98Kj – 298 (-44.1 x 10^{-3}kJ) = -12.98kJ + 13.14kJ = 0.16kJ. As ΔG^0 comes out to be +ve, the reaction will not occur spontaneously.	1 1
21	Electrophiles are electron deficient species and can accept an electron pair from electron rich species. Example:- H^+, Br^+,$NO2^+$, BF_3,etc. A nucliophiles are electron rich species and can donate an electron pair to electron deficient species. Eg:- OH^-, OR^-, CN^-, NH3, etc.	1 1
22	(a) No two electrons of an atom can have all the four quantum numbers identical. (b) n= 3, l=1, m=0, s= -1/2 (c) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^5$.	1 1 1
23	(a) Due to small size of fluorine than chlorine and more inter electronic repulsion in fluorine than chlorine. (b) Due to half filled 2p orbital of nitrogen. (c) Ununoctium, Uuo	1 1 1
24	Aim: $C(s) + 2H_2(g) + 1/2O_2(g) \longrightarrow CH_3OH\ (l)$, Δ_fH^0 =? Eqn. (ii) + 2 Eqn. (iii) – Eqn. (i) gives the required eqn. with ΔH = -393 + 2 (-286) – (-726) kJ mol^{-1} = -239 kJ mol^{-1}. **OR** Correct statements We aim at: $C(s) + ½O_2\ (g) \longrightarrow CO\ (g)$; Δ_fH^0 =? Subtracting eqn. (ii) from eqn. (i), we get $C(s) + 1/2\ O_2(g) - CO\ (g) \longrightarrow 0$; Δ_fH^0 = -393.5 – (-283.0) = -110.5 kJ mol^{-1}. Or $C(s) + 1/2\ O_2(g) \longrightarrow CO\ (g)$; Δ_fH^0 = -110.5 kJ. So, heat of formation of CO is ; Δ_fH^0 = -110.5 kJ mol^{-1}.	1 1 1 1 2
25	Indicating oxidation number and oxidation & reduction Balancing charge and hydrogen atom Balancing number of electron and writing final balanced equation as	1 1 1

	$2MnO^-_4(aq) + 6I^-(aq) + 4H^2O(l) \longrightarrow 2MnO^2(s) + 3I_2(s) + 8OH^-(aq)$	
26	(a) The polarization of a sigma bond due to electron withdrawing or electron donating effect of adjacent groups pr atoms in a carbon chain is called inductive effect. (b) Due to hyperconjugation effect. (c)  Cis-2-butene  Trans-2-butene	
27	(a) (i) 4-methyl pentanal (ii) 2,3-dimethyl butan-1-ol (b) Percentage of carbon =12/44 x 0.198/0.246 x100 = 21.95 % Percentage of hydrogen = 2/18 x 0.1014/0.246 x 100 = 4.48%	½+1/2 1 1
28	 (a) 3 – Ethyl pent -2-ene (b) (i)CH3 CH2 CH2 CH3 (ii) CH2=CH2	1 1 1
29	1. Energy can neither be created nor destroyed. Any other statement. $\Delta U = q + w$ 2. Correct definition with example 3. a state function is a property whose value is independent of the path taken to reach that value. Examples of state functions include: Internal energy, Enthalpy, Entropy.	1 1 1
30	1—B, 2---D, 3-----C, 4 ---C	
31	a. Correct statement b. (i) forward direction (ii) Backward direction (iii) Backward direction (iv) forward direction c. Lewis acids – BF3, NH_4^+. Lewis bases -OH^- F- OR a)Common ion effect is a phenomenon in which degree of dissociation of any weak electrolyte is supressed by addition of small amount of strong electrolyte b) Water has 10^{-7} M H^+ and 10^{-7} M OH^-. When 10^{-8} M HCl is added the concentration of proton in water is not neglected. So, Total $[H^+] = 10^{-7} + 10^{-8} = 10^{-8}[1 + 10] = 11 \times 10^{-8}$ M $pH = -\log(H^+) = -\log(11 \times 10^{-8}) = 8 - \log 11 = 6.598$ (C) (i) HF<HCl<HBr<HI (ii) CH4<NH3<H2O<HF	1 2 2 1 1 1 1 1
32	(a) If a planar ring molecule would have aromatic properties. His rule states that if a cyclic, planar molecule has 4n+2 π electrons, it is considered aromatic. Condition:- (i) Organic compound should have a single cyclic cloud of delocalized π electrons above and below the plane of the molecule. (ii) It should be planer. (iii) It should contain (4n+2 π) electron where n = 1,2,3…etc. (b) (i) 	2 3×1

	(ii)  (iii) Correct reaction **OR** (a) In addition to alkenes, the negative part addendum goes to that carbon atom which has less number of hydrogen atom. (b)  (c) (i)  (ii)  	1 2 2×1
33	(i) Because sigms bond is formed by axial overlapping of two orbitals where as π bond is formed by side wise overlapping of two orbitals. (ii) In NF3 nitrogen is sp3 hybridized where as in BF3 boron is sp2 hybridized. (iii) O2 is paramagnetic due to presence of two unpaired electrons in anti-bonding molecular orbitals. (iv) B/c water molecules are held together with intense inter molecular hydrogen bonding but in H2S molecule there is no hydrogen bonding. (v) P-nitrophenol molecules are associated with inter molecular hydrogen bonding where as in O-nitrophenol intra molecular hydrogen bonding is present. (vi) Due to linear shape of BeH2 dipole moment of each B-H bond are in opposite direction, they cancel each other and net diploe moment is 0. (vii) In water molecule oxygen is sp3 hybridized. Due to presence of two lone pair of electrons shape of water molecular is angular.	5×1
	THE END	