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**PB-T2/CHAK/1221/B 25-APR-2022**

# CHEMISTRY

**ANSWER KEY**

**CLASS**: **XII**  **MAX.MARKS**: **35** **TIME**: **2 HOURS**

|  |  |  |
| --- | --- | --- |
| **Qn** | **VALUE POINTS** | **MARKS** |
| 1 | .i) Butanone < Propanone < Propanal < Ethanal **ii)** Acetophenone < Benzaldehyde< p-Nitrobenzaldehyde | **2** |
| 2 |  | **2** |
| 3 | i) The reaction is reversible; therefore, to shift the equilibirium in the forward direction, the water or the ester formed should be removed as fast as it is formed.  ii)Chloroacetic acid Cl−CH2​−COOH is strongest acid than acetic acid CH3​−COOH. −Cl is electron withdrawing group. It increases the acidity of acetic acid by dispersing negative charge by inductive effect and stabilizing the acetate anion**.** | **2** |
| 4 | i) Methylamine forms H-bonds with water and hence it is soluble in water.The large hydrocarbon part of aniline retards the tendency of the −NH2 group to form H-bonds with water and hence it is only sparingly soluble in water.  ii) Aniline does not undergo Friedel craft's reactions because the reagent AlCl3​ (the Lewis acid which is used as a catalyst in friedel crafts reaction), attacks on the lone pair of nitrogen to form a salt . Due to the positive charge on the N-atom, electrophilic substitution in the benzene ring is deactivated.  iii) Aniline is less basic than ethyl amine due to resonance effect. In aniline, the −NH2​ group is directly attached to the benzene ring. The lone pair of electrons on N atom is in conjugation with benzene ring.Hence, it is less available for protonation because of resonance. | **1**  **1**  **1** |
| 5 | **i)**  Accomplish the following conversions: (vii) Aniline to p-bromoaniline  **ii)** | **1.5** |
| 6 | **ii)** Tetraamminichloridonitrito-N-Cobalt(III) chloride  **OR**  i) [ Fe ( H2O)6] 2+ and [ Fe( CN)6] 4−have two different ligands H2O and CN­­ –. CN­ – being a strong field ligand has a higher value of CFSE (crystal field splitting energy ) than water. As a result, the d-d transitions absorb and give back different wavelengths of light. Thus, they have different colours in a solution  ii) A series of common ligands in ascending order of their crystal-field splitting energy (CFSE) is termed as the Spectrochemical series. Strong field ligands have larger values of CFSE. Whereas, weak field ligands have smaller values of CFSE.  iii) | **2**  **1**  **1**  **1**  **1** |
| 7 | https://haygot.s3.amazonaws.com/questions/1650247_1780840_ans_2cbb8d51682c43939e2faf7c1ff2b397.png | **3** |
| 8 | **i)** There is strong Van der Waal’s forces in easily liquefiable gases hence, easily liquefiable gases such as NH3, HCl etc. are adsorbed to a great extent in comparison to gases such as H2, O2 etc.  **ii)** The residual forces on the surface of the adsorbent are decreased due to adsorption. As a result, the surface energy of the adsorbent is also reduced. Therefore, adsorption is always exothermic.The movement of a gas is restricted when it is adsorbed on a solid surface. This leads to a decrease in the entropy of the gas i.e., ∆S is negative. Now for a process to be spontaneous, ∆G should be negative. Δ*G*=Δ*H*–*T*Δ*S*  Since, ∆S is negative, ∆H has to be negative to make ∆G negative. Hence, adsorption is always exothermic. | **1**  **2** |
| 9 | Aromatic primary amines cannot be prepared by Gabriel phthalimide synthesis as aryl halides do not undergo nucleophilic substitution with the salt formed by phthalimide. **OR**  **i)**  Methylamine (being an aliphatic primary amine)  gives a positive carbylamine test, but dimethylamine does not.  **ii)** HNO 2reacts with aniline at a very low temperature which in turn forms stable diazonium salt. Hence, the evolution of nitrogen gas does not happen.  ii) N-Phenylethanamide | **3**  **1**  **1**  **1** |
| 10 | OR  . | **3** |
| 11  i)  ii)  iii) | i) Cu2+ (aq) is much more stable than Cu+ (aq). This is because although second ionization enthalpy of copper is large but Δhyd (hydration enthalpy) for Cu2+ (aq) is much more negative than that for Cu+ (aq) and hence it more than compensates for the second ionization enthalpy of copper. Therefore, many copper (I) compounds are unstable in aqueous solution and undergo disproportionation as follows:  2Cu+ → Cu2+ + Cu  (ii) The ability of O2 to stabilize higher oxidation states exceeds that of fluorine because oxygen can form multiple bonds with metals.  iii) The transition metals exhibit variable oxidation states because of very close energies of incompletely filled (n – l)d orbitals and ns orbitals due to which both can participate in bonding.    **OR**    This is due to the increasing stability of the species of lower oxidation state to which they are reduced. | **1**  **1**  **1**  **1**  **1**  **1** |
| 12 | i) The decomposition of gaseous ammonia on a hot platinum surface is a zero order reaction at high pressure.      In this reaction, platinum metal acts as a catalyst. At high pressure, the metal surface gets saturated with gas molecules. So, a further change in reaction conditions is unable to alter the amount of ammonia on the surface of the catalyst making rate of the reaction independent of its concentration.    ii)    iii)  **OR** | **1.5**  **1.5**  **2** |