

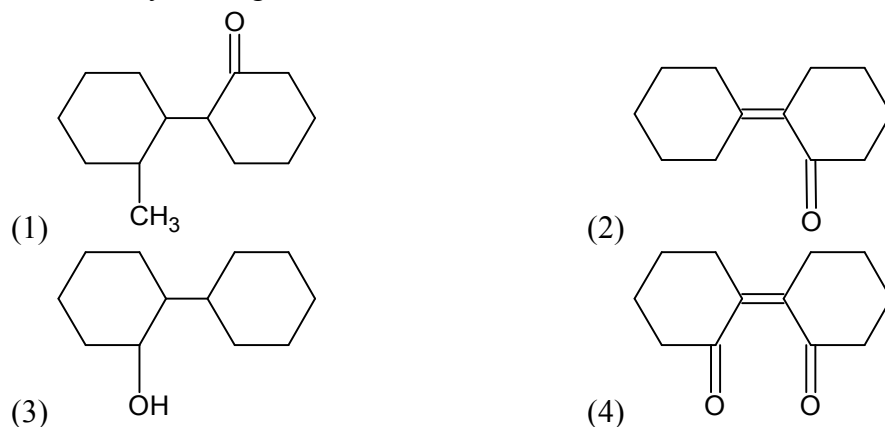
1. HgCl_2 and I_2 both when dissolved in water containing I^- ions the pair of species formed is :
 (1) $\text{HgI}_2, \text{I}_3^-$ (2) HgI_2, I^- (3) $\text{HgI}_4^{2-}, \text{I}_3^-$ (4) $\text{Hg}_2\text{I}_2, \text{I}^-$
2. Predict the correct intermediate and product in the following reaction:

$$\text{H}_3\text{C}-\text{C}\equiv\text{CH} \xrightarrow[\text{HgSO}_4]{\text{H}_2\text{O}, \text{H}_2\text{SO}_4} \text{intermediate} \longrightarrow \text{product}$$

(A) (B)

 (1) A: $\text{H}_3\text{C}-\underset{\text{SO}_4}{\text{C}}=\text{CH}_2$ B: $\text{H}_3\text{C}-\underset{\text{O}}{\text{C}}-\text{CH}_3$
 (2) A: $\text{H}_3\text{C}-\underset{\text{OH}}{\text{C}}=\text{CH}_2$ B: $\text{H}_3\text{C}-\underset{\text{SO}_4}{\text{C}}=\text{CH}_2$
 (3) A: $\text{H}_3\text{C}-\underset{\text{O}}{\text{C}}-\text{CH}_3$ B: $\text{H}_3\text{C}-\text{C}\equiv\text{CH}$
 (4) A: $\text{H}_3\text{C}-\underset{\text{OH}}{\text{C}}=\text{CH}_2$ B: $\text{H}_3\text{C}-\underset{\text{O}}{\text{C}}-\text{CH}_3$
3. The correct statement regarding electrophile is :
 (1) Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from a nucleophile
 (2) Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from a nucleophile
 (3) Electrophile are generally neutral species and can form a bond by accepting a pair of electrons from a nucleophile
 (4) Electrophile can be either neutral or positively charged species and can form a bond by accepting a pair of electrons from a nucleophile
4. Which of the following pairs of compounds is isoelectronic and isostructural?
 (1) $\text{BeCl}_2, \text{XeF}_2$ (2) $\text{TeI}_2, \text{XeF}_2$ (3) $\text{IBr}_2^-, \text{XeF}_2$ (4) $\text{IF}_3, \text{XeF}_2$
5. The species having bond angles of 120° is :
 (1) PH_3 (2) ClF_3 (3) NCl_3 (4) BCl_3
6. Which of the following is a sink for CO?
 (1) Haemoglobin
 (2) Micro organisms present in the soil
 (3) Oceans
 (4) Plants
7. Which one of the following pairs of species have the same bond order?
 (1) CO, NO (2) O_2, NO^+ (3) CN^-, CO (4) N_2, O_2^-

8. Of the following, which is the product formed when cyclohexanone undergoes aldol condensation followed by heating?



9. Name the gas that can readily decolourise acidine KMnO_4 solution:



10. Which one is the wrong statement?

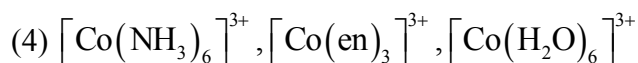
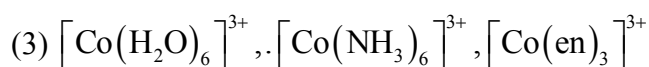
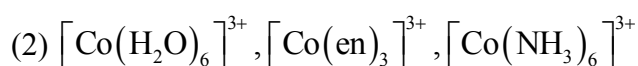
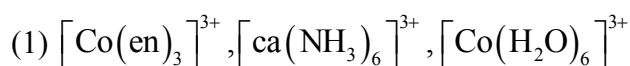
(1) de-Broglie's wavelength is given by $\lambda = \frac{h}{mv}$, where m = mass of the particle, v = group velocity of the particle

(2) The uncertainty principle is $\Delta E \times \Delta t \geq \frac{h}{4}$

(3) Half filled and fully filled orbitals have greater stability due to greater exchange energy, greater symmetry and more balanced arrangement.

(4) The energy of 2s orbital less than the energy of 2p orbital in case of Hydrogen like atoms.

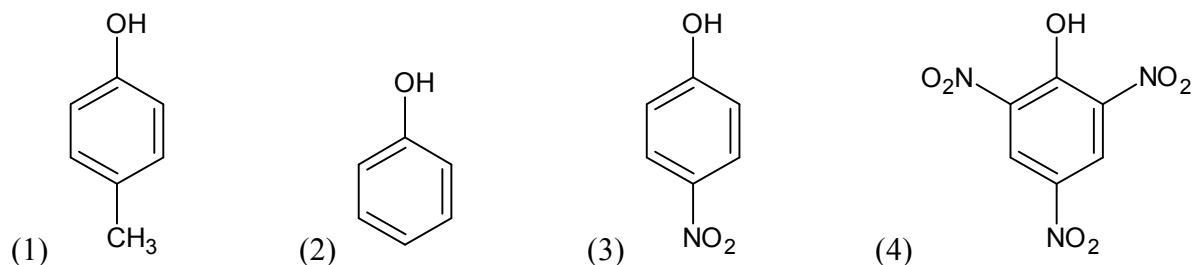
11. Correct increasing order for the wavelength of absorption in the visible region for the complexes of Co^{3+} is :



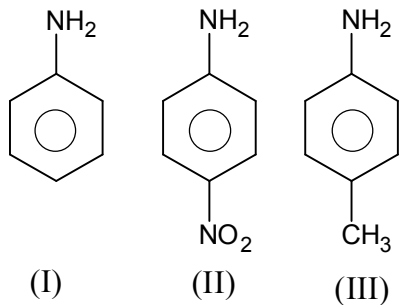
12. The correct order of the stoichiomers of AgCl formed when AgNO_3 in excess is treated with the complexes: $\text{CoCl}_3 \cdot 6\text{NH}_3$, $\text{CoCl}_3 \cdot 5\text{NH}_3$, $\text{CoCl}_3 \cdot 4\text{NH}_3$ respectively is :



13. Which one is the most acidic compound?



14. The correct increasing order of basic strength for the following compounds is :



- (1) II < III < I (2) III < I < II (3) III < II < I (4) II < I < III

15. In which pair of ions both species contains S-S bond?

- (1) $S_2O_7^{2-}$, $S_2O_3^{2-}$ (2) $S_4O_5^{2-}$, $S_2O_3^{2-}$ (3) $S_2O_7^{2-}$, $S_2O_3^{2-}$ (4) $S_4O_4^{2-}$, $S_2O_7^{2-}$

16. Mixture of chloroxylenol and terpineol acts as

- (1) analgetic (2) antiseptic (3) antipyretic (4) antibiotic

17. Which one is the correct order of acidity?

- (1) $CH_2=CH_2 > CH_3-CH=CH_2 > CH_3-C=CH > CH=CH$
 (2) $CH=CH > CH_3-C=CH > CH_2=CH_2 > CH_3-CH_3$
 (3) $CH=CH > CH_2=CH_2 > CH_3-C=CH > CH_3-CH_3$
 (4) $CH_3-CH_3 > CH_2=CH_2 > CH_3-C=CH > CH=CH$

18. The heating of phenyl-methyl ethers with HI produces.

- (1) ethylchlorides (2) isoobenzene (3) phenol (4) benzene

19. A gas is allowed to expand in a well insulated container against a constant external pressure of 2.5 atm from an initial volume of 2.50 L to a final volume of 4.50 L. The change in internal energy ΔU of the gas in joule will be :

- (1) 1136.25 J (2) -500 J (3) -505 J (4) +505 J

20. The most suitable method of separated of 1 : 1 mixture of ortho and para-nitrophenol is :

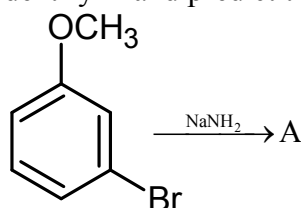
- (1) Sublimation (2) Chromatography (3) Crystallisation (4) Steam distillation

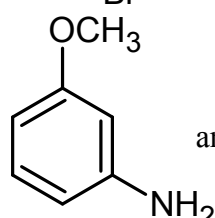
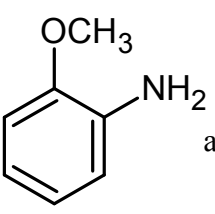
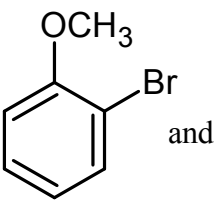
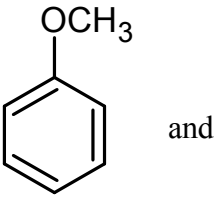
21. With respect to the conformers of ethane, which of the following statements is true?
 (1) Bond angle remains same but bond length changes
 (2) Bond angle changes but bond length remains same
 (3) Both bond angle and bond length change
 (4) Both bond angle and bond length remains same
22. A 20 litre container at 400 K contains $\text{CO}_2(\text{g})$ at pressure 0.4 atm and an excess of SrO (neglect the volume of solid SrO). The volume of the container is now decreased by moving the movable piston fitted in the container. The maximum volume of the container, when pressure of CO_2 attains its maximum value, will be :
 (Given that : $\text{SrCO}_3(\text{s}) \rightleftharpoons \text{SrO}(\text{s}) + \text{CO}_2(\text{g})$, $K_p = 1.6 \text{ atm}$)
 (1) 5 litre (2) 10 litre (3) 4 litre (4) 2 litre
23. A first order reaction has specific reaction of 10^{-2} sec^{-1} . How much time will it take for 20 g of the reactant to reduce to 5 g?
 (1) 238.6 sec (2) 138.6 sec (3) 346.5 sec (4) 693.0 sec
24. For a given reaction, $\Delta H = 35.5 \text{ kJ mol}^{-1}$ and $\Delta S = 83.6 \text{ JK}^{-1} \text{ mol}^{-1}$. The reaction is spontaneous at :
 (Assume that ΔH and ΔS do not vary with temperature)
 (1) $T < 425\text{K}$ (2) $T > 425\text{K}$ (3) all temperature (4) $T > 298\text{K}$
25. In the electrochemical cell :
 $\text{Zn} \parallel \text{ZnSO}_4(0.01\text{M}) \parallel \text{CuSO}_4(1.0\text{M}) \mid \text{Cu}$, the emf of this Daniel cell is E_1 . When the concentration of ZnSO_4 is changed to 1.0 M and that of CuSO_4 changed to 0.01 M, the emf changes to E_2 . From the following, which one is the relationship between E_1 and E_2 ? (Given, $\frac{RT}{F} = 0.059$)
 (1) $E_1 = E_2$ (2) $E_1 < E_2$ (3) $E_1 > E_2$ (4) $E_2 = 0 \neq E_1$
26. An example of a sigma bonded organometallic compound is :
 (1) Ruthenocene (2) Grignand's reagent
 (3) Ferrence (4) Cobaltocene
27. The equilibrium constants of the following are :
 $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ K_1
 $\text{N}_2 + \text{O}_2 \rightleftharpoons 2\text{NO}$ K_2
 $\text{H}_2 + \frac{1}{2}\text{O}_2 \rightarrow \text{H}_2\text{O}$ K_3
 The equilibrium constant (K) of the reaction:
 $2\text{NH}_3 + \frac{5}{2}\text{O}_2 \xrightleftharpoons{K} 2\text{NO} + 3\text{H}_2\text{O}$ will be :
 (1) $K_1 K_3^3 / K_2$ (2) $K_2 K_3^3 / K_1$ (3) $K_2 K_3 / K_1$ (4) $K_2^3 K_3 / K_1$

28. The element $Z = 114$ has been discovered recently. It will belong to which of the following family group and electronic configuration?
- (1) Halogen family, $[\text{Rn}]5f^{14}6d^{10}7s^27p^5$
 - (2) Carbon family, $[\text{Rn}]5f^{14}6d^{10}7s^27p^2$
 - (3) Oxygen family, $[\text{Rn}]5f^{14}6d^{10}7s^27p^4$
 - (4) Nitrogen family, $[\text{Rn}]5f^{14}6d^{10}7s^27p^6$

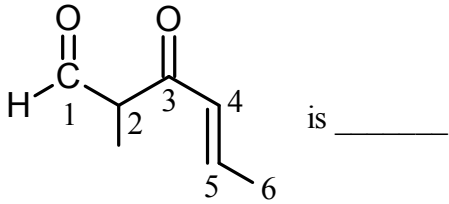
29. Pick out the correct statement with respect to $[\text{Mn}(\text{CN})_6]^{3-}$
- (1) It is sp^3d^2 hybridized and octahedral
 - (2) It is sp^3d^2 hybridized and tetrahedral
 - (3) It is d^2sp^3 hybridized and octahedral
 - (4) It is dsp^2 hybridized and square planar

30. Identify A and predict the type of reaction



- (1)  and substitution reaction
- (2)  and elimination addition reaction
- (3)  and cine substitution reaction
- (4)  and cine substitution reaction

31. It is because of inability of ns^2 electrons of the valence shell to participate in bonding that:
- (1) Sn^{2+} is reducing while Pb^{4+} is oxidizing
 - (2) Sn^{2+} is oxidizing while Pb^{3+} is reducing
 - (3) Sn^{2+} and Pb^{2+} are both oxidizing and reducing
 - (4) Sn^{4+} is reducing while Pb^{4+} is oxidizing

32. Which of the following statements is not correct?
 (1) Insulin maintains sugar level in the blood of a human body.
 (2) Ovalbumin is a simple food reserve in egg white.
 (3) Blood proteins thrombin and fibrinogen are involved in blood clotting.
 (4) Denaturation makes the proteins more active.
33. Which is the incorrect statement?
 (1) $\text{FeO}_{0.98}$ has non stoichiometric metal deficiency defect
 (2) Density decreases in case of crystals with Schottky's defect.
 (3) $\text{NaCl}(s)$ is insulator, silicon is semiconductor, silver is conductor, quartz is piezo electric crystal.
 (4) Frenkel defect is favoured in those ionic compounds, in which sizes of cation and anions are almost equal.
34. The IUPAC name of the compound
- 
- is _____
- (1) 3 - keto - 2 - methylhex - 4 - enal
 (2) 5 - formylhex - 2 - en - 3 - one
 (3) 5 - methyl - 4 - oxohex - 2 - ene - 5 - al
 (4) 3 - keto - 2 - methylhex - 5 - enal
35. The reason for greater range of oxidation states in actinoids is attributed to:
 (1) The radioactive nature of actinoids
 (2) actinoid contraction
 (3) 5f, 6d and 7s levels having comparable energies
 (4) 4f and 5d levels being close in energies
36. Extraction of gold and silver involves leaching with CN^- ion, Silver is Later recovered by:
 (1) Liquefaction
 (2) Distillation
 (3) zone refining
 (4) Displacement with Zn
37. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field?
 (1) Na
 (2) K
 (3) Rb
 (4) Li
38. Which of the following is dependent on temperature?
 (1) Molality
 (2) Molarity
 (3) Mole fraction
 (4) Weight percentage
39. If molality of the dilute solutions is doubled, the value of molal depression constant (K_1) will be:
 (1) doubled
 (2) halved
 (3) tripled
 (4) unchanged
40. Mechanism of a hypothetical reaction $\text{X}_2 + \text{Y}_2 \rightarrow 2\text{XY}$ is given below:
 (i) $\text{X}_2 \rightarrow \text{X} + \text{X}$ (fast)
 (ii) $\text{X} + \text{Y}_2 \rightarrow \text{XY} + \text{Y}$ (slow)
 (iii) $\text{X} + \text{Y} \rightarrow \text{XY}$ (fast)
 The overall order of the reaction will be:
 (1) 1
 (2) 2
 (3) 0
 (4) 1.5

