

1. By which one of the following compounds both CH_4 and CH_3-CH_3 can be prepared in one step ?

- (a) CH_3I (b) CH_3OFI
(c) $\text{CH}_3\text{CH}_2\text{F}$ (d) $\text{C}_2\text{H}_5\text{OH}$

2. $\text{R}-\text{NH}-\text{COH}$ product $\xrightarrow[\text{Pyridine}]{\text{POCl}_3}$ Pyridine

In the given reaction, what will be the product ?

- (a) $\text{R}-\text{N}=\text{C}=\text{O}$ (b) $\text{R}-\text{N}\equiv\text{C}$
(c) $\text{R}-\text{C}\equiv\text{N}$ (d) None of these

3. Certain crystals produce electric signals on application of pressure. This phenomenon is called

- (a) pyroelectricity (b) ferroelectricity
(c) piezoelectricity (d) ferrielectricity

4. If for a sucrose solution, elevation in boiling point is 0.1°C , then what will be the boiling point of NaCl solution for same molal concentration ?

- (a) 0.1°C (b) 0.2°C
(c) 0.08°C (d) 0.001°C

5. The element ${}_{90}\text{Th}^{232}$ belongs to thorium series. Which of the following will act as the end product of the series ?

- (a) ${}_{82}\text{Pb}^{208}$ (b) ${}_{82}\text{Pb}^{209}$
(c) ${}_{82}\text{Pb}^{206}$ (d) ${}_{82}\text{Pb}^{207}$

6. The reaction of HBr with $\text{CH}_3-\text{C}(\text{CH}_3)=\text{CH}_2$ in the presence of peroxide will give

- (a) $\text{CH}_3-\text{C}(\text{CH}_3)(\text{CH}_2\text{Br})-\text{CH}_3$ (b) $\text{CH}_3-\text{CH}_2-\text{C}(\text{CH}_3)_2$
(c) $\text{CH}_3-\text{C}(\text{CH}_3)(\text{Br})-\text{CH}_3$ (d) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{Br}$

7. A mixture of camphor and benzoic acid can be separated by:

- (a) chemical method (b) sublimation
(c) fractional distillation (d) extraction with a solvent

8. Hardness of water is due to presence of salts of:

- (a) Na^+ and K^+ (b) Ca^{2+} and Mg^{2+}
(c) Ca^{2+} and K^+ (d) Ca^{2+} and N_2^+

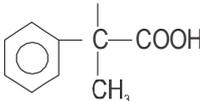
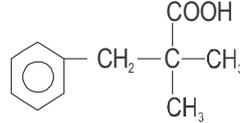
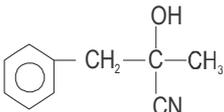
9. The half-life of a first order reaction having rate constant $k = 1.7 \times 10^{-5} \text{ s}^{-1}$ is:

- (a) 12.1 h (b) 9.7 h
(c) 11.3 h (d) 18 h

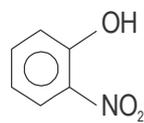
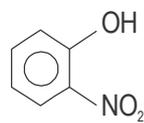
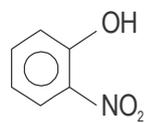
10. In a set of reactions, acetic acid yielded a product D.



The structure of D would be

- (a)  (b) 
(c)  (d) 

11. Which one of the following compounds is most acidic ?

- (a) $\text{Cl}-\text{CH}_2-\text{CH}_2-\text{OH}$ (b) 
(c)  (d) 

12. A nuclide of an alkaline earth metal undergoes radioactive decay by emitting α -particles in succession. The element of the periodic table to which the resulting daughter element would belong to

- (a) Group 14 (b) Group 16
(c) Group 4 (d) Group 6

13. Which one of the following forms micelles in aqueous solution above certain concentration?

- (a) Urea
(b) Dodecyl trimethyl ammonium chloride
(c) Pyridinium chloride
(d) Glucose

14. Electrolytic reduction of nitrobenzene in weakly acidic medium gives

- (a) aniline
(b) nitrosobenzene
(c) N-phenylhydroxylamine
(d) p-hydroxyaniline

15. Equilibrium constants K_1 and K_2 for the following equilibria.

- (a)  (b) $K_2 = K_1^2$
(c)  (d) $K_2 = K_1$

- (c) (d) $K_2 = \frac{1}{K_1^2}$
16. H₂S gas when passed through a solution of cations containing HCl precipitates the cations of second group of qualitative analysis but not those belonging to the fourth group, it is because:
 (a) presence of HCl decreases the sulphide ion concentration
 (b) presence of HCl increases the sulphide ion concentration
 (c) solubility product of group II sulphides is more than that of group IV sulphides
 (d) sulphides of group IV cations are unstable in HCl
17. A solution has a 1 : 4 mole ratio of pentane to hexane. The vapour pressure of the pure hydrocarbons at 20°C are 440 mm of Hg for pentane and 120 mm of Hg for hexane. The mole fraction of pentane in the vapour phase would be
 (a) 0.549 (b) 0.200
 (c) 0.706 (d) 0.478
18. 4.5 g of aluminium (Atomic mass 27 amu) is deposited at cathode from Al³⁺ solution by a certain quantity of electric charge. The volume of hydrogen produced at STP from H⁺ ions in solution by the same quantity of electric charge will be
 (a) 22.4 L (b) 44.8 L
 (c) 5.6 L (d) 11.2 L
19. Which does not give a precipitate with AgNO₃ solution?
 (a) (Co(NH₃)₆)Cl₃ (b) [Co(NH₃)₄]Cl
 (c) (Co(NH₃)₄)Cl₂ (d) [Co(NH₃)₃]Cl
20. The product of following reaction is
 $2\text{CH}_3\text{MgBr} + \text{CH}_2\text{O} \rightarrow$
 (a) CH₃OH (b) C₂H₅OH
 (c) CH₄ (d) C₂H₆
21. Which of the following does not reduce Fehling's solution?
 (a) Benzaldehyde (b) Formic acid
 (c) Glucose (d) Fructose
22. Reaction of ethyl formate with excess of CH₃MgI followed by hydrolysis give
 (a) n-propyl alcohol (b) isopropyl alcohol
 (c) acetaldehyde (d) acetone
23. Hydrolysis of phenyl isocyanide forms.
 (a) benzoic acid (b) formic acid
 (c) acetic acid (d) None of these
24. The monomer of teflon is
 (a) CHF = CH₂ (b) CF₂ = CF₂
 (c) CHCl = CHCl (d) CHF = CHCl
25. A fruity smell is produced by the reaction of C₂H₅OH with
 (a) CH₂COCH₃ (b) CH₂COOH
 (c) FC1_s (d) CH₃CHO
26. The compounds formed at anode in electrolysis of an aqueous solution potassium acetate, are
 (a) C-Hg and CO₂ (b) C₂H₄ and CO₂
 (c) CH₄ and H₂ (d) CH₄ and CO₂
27. Which of the following is not correct regarding the electrolytic preparation of H₂O₂?
 (a) Lead is used as cathode
 (b) 50% H⁺ is used
 (c) Hydrogen is liberated at anode
 (d) Sulphuric acid undergoes oxidation
28. Which of the following is correct?
 (a) Catalyst undergoes permanent chemical change
 (b) Particle size of solute in true solution is 10⁻³ nm
 (c) Starch solution is a hydrosol
 (d) Hydrolysis of liquid ester in the presence of mineral acid is an example of heterogeneous catalysis
29. Which of the following reagents converts both acetaldehyde and acetone to alkanes?
 (a) Ni/H₂ (b) LiAlH₄
 (c) I₂/NaOH (d) Zn-Hg/conc. HCl
30. What is the electrode potential (in V) of the following at 25°C?
 Ni²⁺ (0.1M) | Ni(s)
 (Standard reaction potential of Ni²⁺ | Ni is
 (a) -0.28 V (b) -0.34 V
 (c) -0.82 V (d) -0.22 V

- A 0.5 g/L solution of glucose is found to be isotonic with a 2.5 g/l. solution of an organic compound. What will be the molecular weight of that organic compound ?
 (a) 300 (b) 600
 (c) 900 (d) 200
- If 50% of a radioactive substance dissociates in 15 min, then the time taken by substance to fade to 99% will be
 (a) 50 min (b) 100 min
 (c) 99 min (d) 150 min
- The best method to separate the mixture of ortho and para nitrophenol (1 : 1) is
 (a) vaporisation (b) colour spectrum
 (c) distillation (d) crystallisation
- A 0.1 aqueous solution of a weak acid is 2% ionised. If the ionic product of water is 1×10^{-14} , the $[\text{OH}^-]$ is
 (a) $5 \times 10^{-12} \text{ M}$ (b) $2 \times 10^{-3} \text{ M}$
 (c) $1 \times 10^{-14} \text{ M}$ (d) None of these
- 9.2 g N_2O_4 is heated in a 1 L vessel till equilibrium state is established

$$\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$$
 In equilibrium state 50% N_2O_4 was dissociated. Equilibrium constant will be (mol wt. of $\text{N}_2\text{O}_4 = 92$)
 (a) 0.1 (b) 0.4
 (c) 0.3 (d) 0.2
- Disperse phase and dispersion medium in butter are respectively
 (a) solid and liquid (b) liquid and solid
 (c) liquid and liquid (d) solid and solid
- Which one of the following reactions is called Rosemund reaction ?
 (a) Aldehydes are reduced to alcohols
 (b) Acids are converted to acid chlorides
 (c) Alcohols are reduced to hydrocarbons
 (d) Acid chlorides are reduced to aldehydes
- The complex ion which has no d-electrons in the central metal atom is.
 (a) $[\text{MnO}_4]^-$ (b) $[\text{Co}(\text{NH}_3)_6]^{3+}$
 (c) $[\text{Fe}(\text{CN})_6]^{3-}$ (d) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$
- The only o-p-directing group which is deactivating in nature is
 (a) $-\text{NH}_2$ (b) $-\text{OH}$
 (c) $-\text{X}$ (halogens) (d) $-\text{R}$ (alkyl groups)
- Which of the organic compounds will give red colour in Lassaigne test ?
 (a) $\text{C}_6\text{H}_5\text{NH}_2$ (b)
$$\text{NH}_2 - \overset{\text{S}}{\parallel} \text{C} - \text{NH}_2$$
- $$\text{NH}_2 - \overset{\text{O}}{\parallel} \text{C} - \text{NH}_2$$
 (d) None of these
- Considering H_2O as weak field ligand, the number of unpaired electrons in $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ will be (Atomic number of Mn = 25)
 (a) five (b) two
 (c) four (d) three
- Ethyl alcohol reacts with thionyl chloride to give
 (a) $\text{CH}_3\text{CH}_2\text{Cl} + \text{HCl}$
 (b) $\text{CH}_3\text{CH}_2\text{Cl} + \text{H}_2\text{O} + \text{SO}_2$
 (c) $\text{CH}_3\text{CH}_2\text{Cl} + \text{HCl} + \text{SO}_2$
 (d) $\text{CH}_3\text{CH}_2\text{Cl} + \text{SO}_2 + \text{Cl}_2$
- Gabriel phthalimide reaction is used for the preparation of
 (a) primary aromatic amines
 (b) secondary amines
 (c) primary aliphatic amines
 (d) tertiary amines
- Primary alcohols can be obtained from the reaction of R-Mg-X with
 (a) CO_2 (b) HCHO
 (c) CH_3CO (d) H_2O
- Proteins are composed of
 (a) α -amino acids (b) carbohydrates
 (c) vitamins (d) mineral salts
- The bond length of HCl bond is $2.29 \times 10^{-10} \text{ m}$. The percentage ionic character of HCl, if measured dipole moment is $6.226 \times 10^{-30} \text{ C-m}$, is
 (a) 8% (b) 20%
 (c) 17% (d) 50%
- Leaching is a process of
 (a) reduction (b) concentration
 (c) refining (d) oxidation
- Electrolysis of fused NaCl will give
 (a) Na (b) NaOH
 (c) NaClO (d) NaClO_3
- Which one of the following complexes is outer orbital complex ?
 (a) $[\text{Co}(\text{NH}_3)_6]^{3+}$ (b) $[\text{Mn}(\text{CN})_6]^{4-}$
 (c) $[\text{Fe}(\text{CN})_6]^{4-}$ (d) $[\text{Ni}(\text{NH}_3)_6]^{2+}$
- The rate equation for a reaction,

$$\text{A} \rightarrow \text{B}$$
 is $r = k[\text{A}]^0$. If the initial concentration of reactant is a mol dm^{-3} , the half-life period of the reaction is
 (a) $\frac{a}{2k}$ (b) $\frac{k}{a}$
 (c) $\frac{a}{k}$ (d) $\frac{2a}{k}$

22. In electrophilic aromatic substitution reaction the, nitro group is meta directing because it.
- decreases electron density at ortho and para positions.
 - decreases electron density at meta position.
 - increases electron density at meta position.
 - Increases electron density at ortho and para positions.
23. The compound which is not formed during the distillation of a mixture of calcium formate and calcium acetate is
- methanal
 - propanal
 - propanone
 - ethanal
24. In which of the following, NH_3 is not used ?
- Tollen's reagent
 - Nessler's reagent
 - Group reagent for the analysis of IV group basic radicals
 - Group reagent for the analysis of III group basic radicals
25. Hyperconjugation is most useful for stabilising which of the following carbocations?
- Neo-pentyl
 - Tert butyl
 - Iso-propyl
 - Ethyl
26. The isomerism that arises due to restricted bond rotation is
- metamerism
 - optical isomerism
 - position isomerism
 - geometrical isomerism
27. Amine that cannot be prepared by Gabriel phthalimide synthesis is
- aniline
 - benzylamine
 - diethylamine
 - isobutylamine
28. 56 g of nitrogen and 90 g of oxygen are mixed isothermally and at a total pressure of 10 atm. The partial pressures of oxygen and nitrogen (in atm) are respectively
- 4, 6
 - 5, 5
 - 2, 8
 - 6, 4
29. $\text{CH}_3\text{COOH} \xrightarrow{\text{Br}_2/\text{P}} \text{Y} \xrightarrow[\text{(ii) H}_3\text{O}^+]{\text{(i) KCN}} \text{X}$
- glycolic acid
 - alpha-hydroxy propionic acid
 - succinic acid
 - malonic acid
30. Acetic anhydride is prepared in the laboratory by heating sodium acetate with
- ethyl chloride
 - acetyl chloride
 - conc H_2SO_4
 - zinc dust

- H =
- IA, IIA, F fixed O.S.
- More -Ve more size.
(among isoelectronic species)
- NO wants to become NO⁺
Bond order increases from 2.5 to 3.
- Small cation more covalent.
- $\begin{array}{|c|c|} \hline + & - \\ \hline + & - \\ \hline \end{array}$
- Be, B, Al electron deficient
- Tl, Pb, Bi inert pair effect.
- Small ions more hydrated less mobile.
- NBS allylic bromination
- Basicity = no of OH groups =
no of (H) present
(except H₃PO₃ / H₃PO₂)
- Less S.R.P. better reducing agent.
- Na in Liq NH₃
≡ to transalkene (STOP)
- H₂/Pd/S Rosenmund
- (2,0), (2,1), (2,2) shapes of molecules.
- All Pd²⁺, Pt²⁺ complexes in 4 coordination.
are dsp², squareplanar dia
- Non-metals want to form
as many bonds as possible ... to get rid of l.p.
- CO, CN⁻, NO⁺ π - acid ligands
- Synergic bond minimum 4 pairs on metal
- No synergic bond synergic interaction.
- H - bond F - H, -O - H, - N - H Only
- Isostructural same no B.P. & I. P
- E. A. N. = Z - O.S + 2 x no of dative bond.
- No U. P.E. no color dia
- ΔH = H_p - H_r (except when H_c & BDE)
- FeSO₄, FeCl₂, FeO..... Reducing agents.
- Max O.S. can act as O.A. Only
- Min O.S. Reducing agent only.
- Chromyl chloride test soluble Cl⁻ Only.
- Prussian blue Fe³⁺[Fe²⁺]
- Litmus turning white bleaching.
- Unexpected solubility complex formation.
- Violet coloration with neutral FeCl₃ phenolic -OH
- E_(H) = E_(He) =
- White PPT with silveramine - Terminal alkynes.
- C - NH - bond peptide
 $\begin{array}{c} \text{O} \\ || \\ \text{C} - \text{NH} \end{array}$
- Greater the charge greater the flocculation.
- Concentration increased "P times" "rate" increased by q times order = log_p q.
- [B:→A] Lewis theory.
- PCC / PDC alc to carbonyl (STOP)
- Br₂ + KOH Hoffman Amide to Amine O √ N meq.
- ml x N = meq
- B.Pt, critical temp, Ease of liquefaction
- V + M x C = intermolecular forces
44. $\begin{array}{c} \text{H}_2\text{O}_2, \text{O}_3, \text{CaOCl}_2, \dots \text{ extra (O)} \\ \text{E.W.G - meta directing} \end{array}$
- CN⁻, CO, NO⁺ & all polydentate ligand always strong.
- If L.P. is present polar, Lewis base, ligand Nu⁻ *M⁻ group.
-
- SnO, SnO₂, PbO, PbO₂ inert pair effect.
- Cp : C : C = 1 : 1.128 : 1.224
- K. E. & T. E of electron
- n- factor is ability factor.
- alc / old / ketones with 3α hydrogen haloform.
- ketoximes $\frac{\text{anything}}{\text{alidic}}$ Beckman
- Aromatic aldehyde + anhydride with 2α hydrogen perkin.
- All the best - rsn