

IIT-JEE-Chemistry-Screening-2005

1. Which species has the maximum number of lone pair of electrons on the central atom?
 - (a) $[\text{ClO}_3^-]$
 - (b) XeF_4
 - (c) SF_4
 - (d) $[\text{I}_3^-]$
2. Which kinds of isomerism is exhibited by octahedral $\text{Co}(\text{NH}_3)_4\text{Br}_2\text{Cl}$?
 - (a) Geometrical and ionization
 - (b) Geometrical and optical
 - (c) Optical and ionization
 - (d) Geometrical only
3. Which is the most thermodynamically stable allotropic form of phosphorus?
 - (a) red
 - (b) white
 - (c) black
 - (d) yellow
4. Which ore contains both Iron and Copper?
 - (a) Cuprite
 - (b) Chalcocite
 - (c) Chalcopyrite
 - (d) Malachite
5. Which of the following is not oxidised by O_3 ?
 - (a) KI
 - (b) FeSO_4
 - (c) KMnO_4
 - (d) K_2MnO_4
6. Which one of the following statement for order of reaction is not correct?
 - (a) Order can be determined experimentally
 - (b) Order of reaction is equal to sum of the power of concentration terms in differential rate law
 - (c) It is not affected with stiochiometric coefficient of the reactants
 - (d) Order can not be fractional
7. How will you convert butan-2-one to propanoic acid?
 - (a) Tollen's reagent
 - (b) Fehling solution
 - (c) $\text{NaOH}/\text{I}_2/\text{H}^+$
 - (d) $\text{NaOH}/\text{NaI}/\text{H}^+$

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8. Which blue-liquid is obtained on reacting equimolar amounts of two gases at -30°C ?

- (a) N_2O
- (b) N_2O_3
- (c) N_2O_4
- (d) N_2O_5

9. Which of the following resonating structures of 1-methoxy-1, 3-butadiene is least stable?

- (a) $\text{CH}_2\text{—CH=CH—CH=O—CH}_3$
- (b) $\text{CH}_2=\text{CH}_2\text{—CH—CH=O—CH}_3$
- (c) $\text{CH}_2\text{—CH—CH=CH—O—CH}_3$
- (d) $\text{CH}_2=\text{CH—CH—CH—O—CH}_3$

10. The ratio of the rate of diffusion of helium and methane under identical condition of pressure and temperature will be:

- (a) 4
- (b) 2
- (c) 1
- (d) 0.5

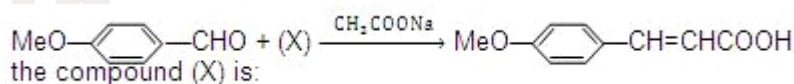
11. When PbO_2 reacts with conc. HNO_3 the gas evolved is:

- (a) NO_2
- (b) O_2
- (c) N_2
- (d) N_2O

12. In which of the following crystals alternate tetrahedral voids are occupied?

- (a) NaCl
- (b) ZnS
- (c) CaF_2
- (d) Na_2O

13.



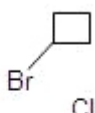



- (a) $\text{CH}_3\text{—COOH}$
- (b) $\text{BrCH}_2\text{—COOH}$
- (c) $(\text{CH}_3\text{CO})_2\text{O}$
- (d) CHO—COOH

14. The elevation in boiling point of a solution of 13.44 g of CuCl_2 in 1 kg of water using the following information will be:

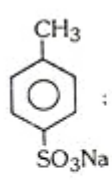
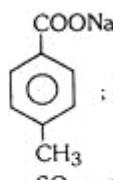
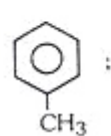
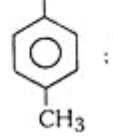
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- (a) 0.16
 (b) 0.05
 (c) 0.1
 (d) 0.2

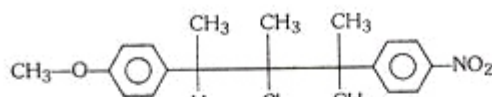
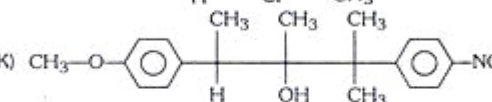
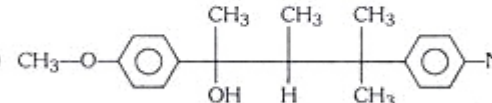
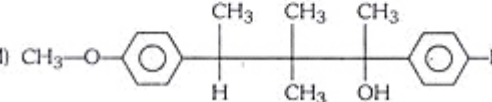
15. What would be the product formed when 1-bromo-3-chloro cyclobutane reacts with two equivalents of metallic sodium in ether?

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

16. 4-methyl benzene sulphonic acid reacts with sodium acetate to give :

- (a)  ; CH_3COOH (b)  ; SO_3
 (c)  ; SO_3 (d)  ; NaOH

17. The following on hydrolysis in aqueous acetone will give :

- 
 (K) 
 (L) 
 (M) 

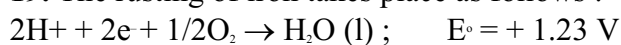
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- (a) Mixture of (K) and (L)
- (b) Mixture of (K) and (M)
- (c) only (M)
- (d) only (K)

18. 0.1 mole of CH_3NH_2 ($K_b = 5 \times 10^{-4}$) is mixed with 0.08 mole of HCl and diluted to one litre. What will be the H^+ concentration in the solution?

- (a) 8×10^{-2} M
- (b) 8×10^{-11} M
- (c) 1.6×10^{-11} M
- (d) 8×10^{-5} M

19. The rusting of iron takes place as follows :



Calculate ΔG° for the net process

- (a) -322 kJ mol^{-1}
- (b) -161 kJ mol^{-1}
- (c) -152 kJ mol^{-1}
- (d) -76 kJ mol^{-1}

20. Name of the structure of silicates in which three oxygen atoms of $[\text{SiO}_4]^{4-}$ are shared is :

- (a) pyrosilicate
- (b) sheet silicate
- (c) linear chain silicate
- (d) three dimensional silicate

21. Lyophilic sols are :

- (a) irreversible sols
- (b) they are prepared from inorganic compounds
- (c) coagulated by adding electrolytes
- (d) self-stabilizing

22. Which pair of compounds is expected to show similar colour in aqueous medium?

- (a) FeCl_3 and CuCl_2
- (b) VOCl_2 and CuCl_2
- (c) VOCl_2 and FeCl_2
- (d) FeCl_2 and MnCl_2

23. The two forms of D-glucopyranose obtained from the solution of D-glucose are called :

- (a) isomer
- (b) anomer

GRAVITY CLASSES

- (c) epimer
- (d) enantiomer

24. The number of radial nodes of 3s, and 2p orbitals are respectively :

- (a) 2, 0
- (b) 0, 2
- (c) 1, 2
- (d) 2, 1

25. A metal nitrate reacts with KI to give a black precipitate which on addition of excess of KI convert into orange colour solution. The cation of metal nitrate is:

- (a) Hg^{2+}
- (b) Bi^{3+}
- (c) Pb^{2+}
- (d) Cu^+

26. When phenyl magnesium bromide reacts with t-butanol, the product would be:

- (a) benzene
- (b) phenol
- (c) t-butyl benzene
- (d) t-butyl phenyl ether

27. The best method to prepare cyclohexene from cyclohexanol is by using :

- (a) conc. $\text{HCl} + \text{ZnCl}_2$
- (b) conc. H_3PO_4
- (c) HBr
- (d) conc. HCl

28. When one mole of monoatomic ideal gas at T K undergoes adiabatic change under a constant external pressure of 1 atm changes volume from 1 litre to 2 litre. The final temperature in kelvin would be :

- (a) $T/2^{(2/3)}$
- (b) $T + 2/(3 \times 0.0821)$
- (c) T
- (d) $T - 2/(2 \times 0.0821)$

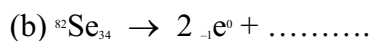
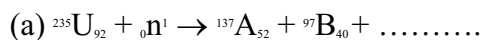
IIT-JEE-Chemistry-Mains-2005

1. Monomer A of a polymer of ozonolysis yields two moles of HCHO and one mole of CH_3COCHO .

- (a) Deduce the structure of A.

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2. Fill in the blanks



3. (a) Calculate the amount of calcium oxide required when it reacts with 852 g of P_4O_{10} .
 (b) Write the structure of P_4O_{10} .

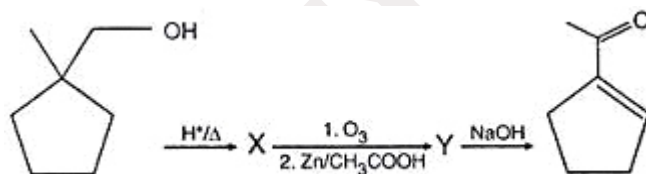
4. An element crystallizes in fcc lattice having edge length 400 pm. Calculate the maximum diameter of atom which can be placed in interstitial site without distorting the structure.

5. 20% surface sites have adsorbed N_2 . On heating N_2 gas evolved from sites and were collected at 0.001 atm and 298 K in a container of volume is 2.46 cm^3 . Density of surface sites is $6.023 \times 10^{14}/\text{cm}^2$ and surface area is 1000 cm^2 , find out the number of surface sites occupied per molecule of N_2 .

6. Predict whether the following molecules are iso-structural or not. Justify your answer.

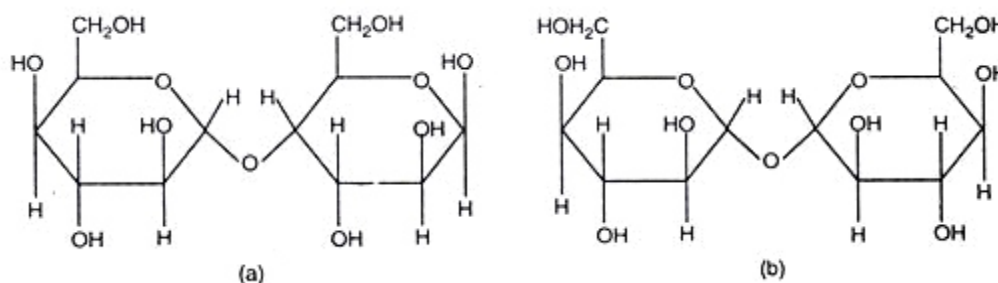
- (i) NMe_3
 (ii) $\text{N}(\text{SiMe}_3)_3$

7.



Identify X and Y.

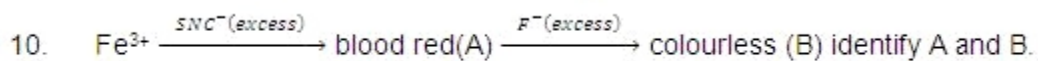
8. Which of the following disaccharide will not reduce Tollen's reagent?



9. Write balanced chemical equation for developing a black and white photographic film. Also give reason why the solution of sodium thiosulphate on acidification turns milky

GRAVITY CLASSES

white and give balance equation of this reaction.



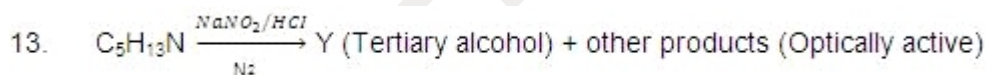
- (a) Write IUPAC name of A and B.
 (b) Find out spin only magnetic moment of B.



Time (in Min)	0	100	200
Partial pressure of X (in mm of Hg)	800	400	200

- Assuming ideal gas condition. Calculate
 (a) Order of reaction
 (b) Rate constant
 (c) Time taken for 75% completion of reaction.
 (d) Total pressure when $P_x = 700$ mm

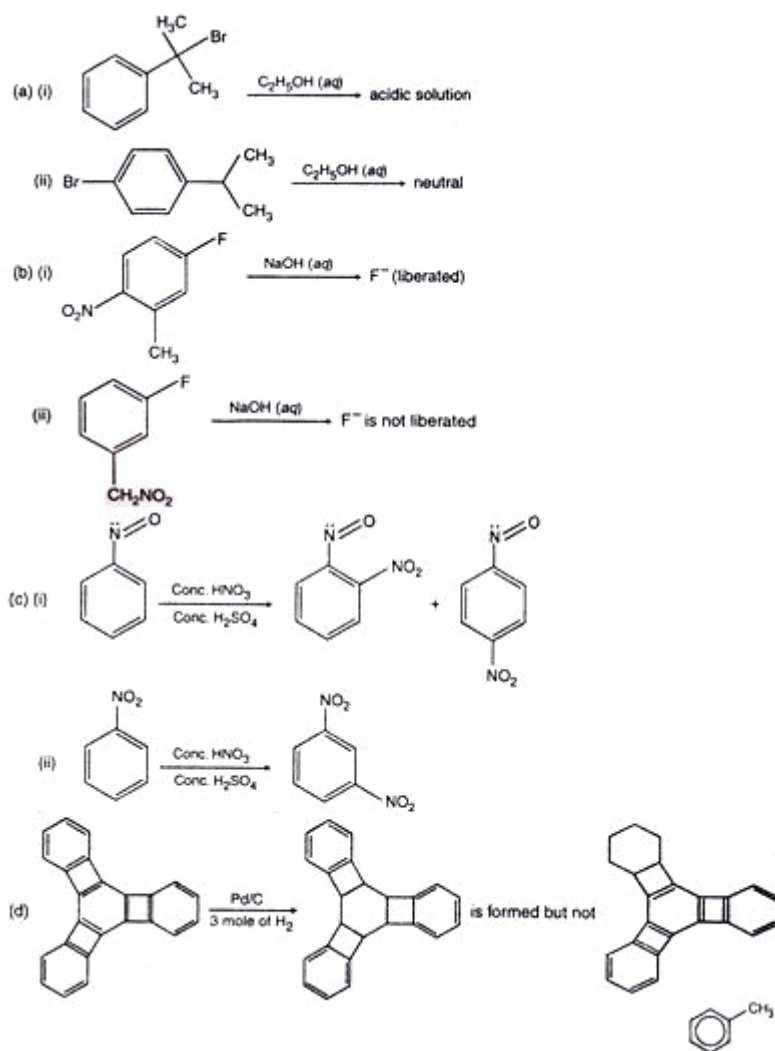
12. (a) Calculate velocity of electron in first Bohr orbit of hydrogen atom (Given $r = a_0$)
 (b) Find de-Broglie wavelength of the electron in first Bohr orbit.
 (c) Find the orbital angular momentum of 2p-orbital in terms of $h/2\pi$ units.



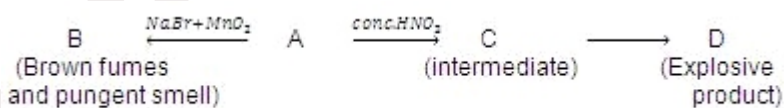
Find X and Y. Is Y optically active? Write the intermediate steps.

14. Give reasons :

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15.



Find A, B, C and D. Also write equations A to B and A to C.

16.



Identify the metal M and hence MCl_4 . Explain the difference in colours of MCl_4 and A.

GRAVITY CLASSES

17. $\mu_{\text{obs}} = \sum \mu_i x_i$

Where μ_i is the dipole moment of stable conformer and x_i is the mole fraction of that conformer.

(a) Write stable conformer for $Z-\text{CH}_2-\text{CH}_2-Z$ in Newman's projection.

If $\mu_{\text{solution}} = 1.0 \text{ D}$ and mole fraction of anti form = 0.82, find μ_{Gauche}

(b) Write most stable meso conformer of



If (i) $Y = \text{CH}_3$ about C_2-C_3 rotation and

(ii) $Y = \text{OH}$ about C_1-C_2 rotation.

18. (a) Calculate ΔG° of the following reaction

