



Rao IIT Academy

Symbol of Excellence and Perfection

JEE | MEDICAL-UG | BOARDS | KVPY | NTSE | OLYMPIADS

Rao IIT Academy JEE - Main Level

ONLINE - 2018

CHEMISTRY

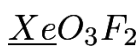
Solutions

1.

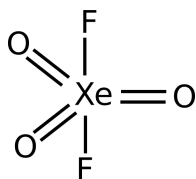
Difficulty : Medium

Topics :

Chemical Bonding,
P-block,



$SN = 10, sp^3d$, Trigonal bipyramidal



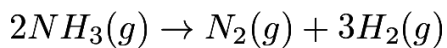
Number of bond pair = 5

Number of π bond = 3

Lone pair = 0

2.

Difficulty : Medium

Topics :
P-block,


$$\text{Maximum quantity of } N_2 \text{ gas produced} = \frac{1}{17} \times \frac{1}{2} \times 28 = 0.82$$

3.

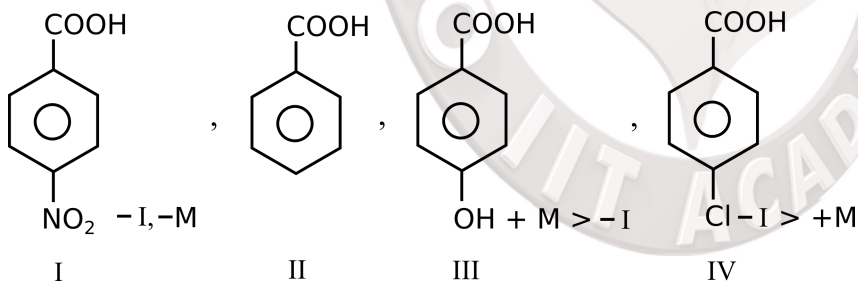
Difficulty : Easy

Topics :
S-block,
 KO_2 Potassium superoxide

 $K^+O_2^{-1}$; Oxidation state of oxygen in O_2^- is $-\frac{1}{2}$.

4.

Difficulty : Easy

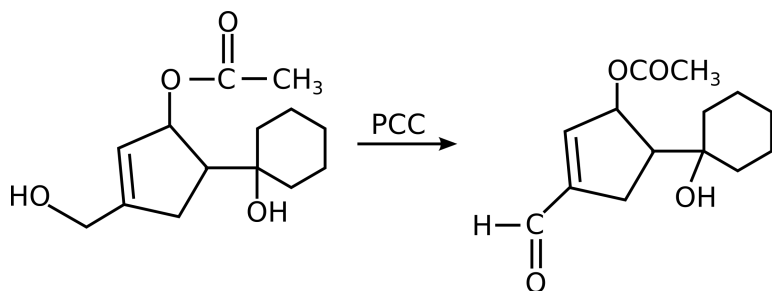
Topics :
GOC,

acidic strength $I > IV > II > III$

5.

Difficulty : Medium

Topics :

Alcohols,



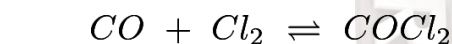
P.C.C oxidises 1° and 2° alcohol into aldehyde and ketones respectively.

6.

Difficulty : Easy

Topics :

Chemical equilibrium,



$$t = 0 \quad 2 \quad 3$$

$$t = t \quad 2 - x \quad 3 - x \quad x$$

$$\text{Moles of } CO = 2 - x = 1$$

$$x = 1$$

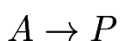
$$K_C = \frac{\left(\frac{x}{v}\right)}{\left(\frac{2-x}{v}\right)\left(\frac{3-x}{v}\right)} = \frac{5}{2} = 2.5$$

7.

Difficulty : Easy

Topics :

Chemical Kinetics,



$$\text{For first order } t_{1/2} = \frac{\ln 2}{k} = 10 \text{ days}$$

$$\text{For } t_{1/4} = \frac{\ln 4/3}{k} = t$$

$$\Rightarrow \frac{\ln 2}{2 \ln 2 - \ln 3} = \frac{10}{t}$$

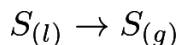
$$t_{1/4} = \frac{(2 \times 0.693 - 1.1)}{0.693} \times 10 = 4.1$$

8.

Difficulty : Medium

Topics :

Thermodynamics,



$$\Delta G^\circ = \Delta G_{f,s(g)}^\circ - \Delta G_{f,s(l)}^\circ$$

$$= 103 - 100.7 = 2.3 \text{ KCal}$$

$$\Delta G^\circ = -RT \ln P$$

$$2.3 \times 1000 = -2.3 \times 2 \times 500 \log P$$

$$\log P = -1$$

$$P = 0.1 \text{ atm}$$

9.

Difficulty : Medium

Topics :

Environmental Chemistry,

Polluted water has BOD value higher than 10 ppm.

Clean water has less than 5 ppm.

10.

D

Difficulty : Easy

Topics :

Polymers,

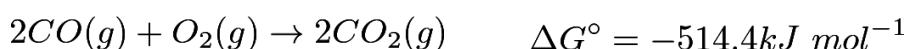
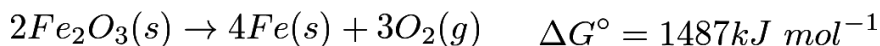
Chain growth polymerisation can involve homopolymerisation and with as copolymerisation.

11.

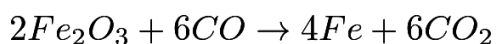
Difficulty : Medium

Topics :

Thermodynamics,



For reaction



$$\Delta G = -514.4 \times 3 + 1487 = -56.2 \text{ kJ mol}^{-1}$$

12.

Difficulty : Medium

Topics :

**ORGANIC CHEMISTRY,
basic Principle of Technique,**

Column chromatography :

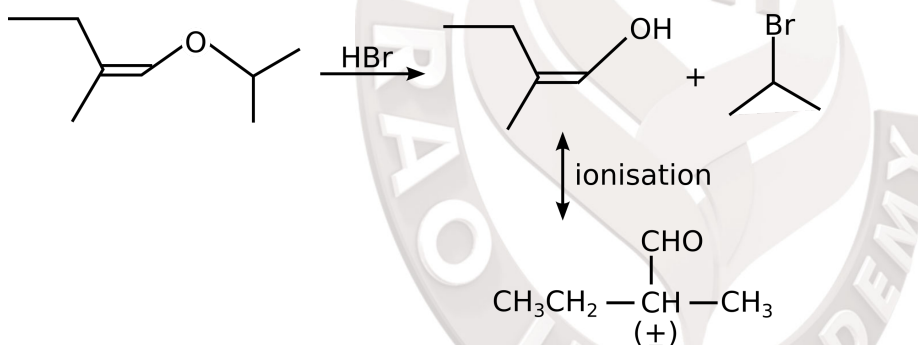
The principle of column chromatography is based on differential adsorption of substance by the adsorbent. The rate at which the components of a mixture are separated depends on the activity of the adsorbent and polarity of the solvent if the activity of the adsorbent is very high and polarity of the solvent is very low, then the separation is very slow but gives a good separation.

R_f is defined as the ratio of the distance travelled by the center of a spot to the distance travelled by the solvent from greater Q_f , greater affinity of solute to the solvent.

13.

Difficulty : Medium

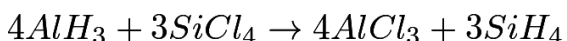
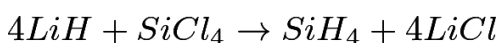
Topics :

Ethers,


14.

Difficulty : Medium

Topics :

P-block,


15.

Difficulty : Medium

Topics :

Solid State,

CsCl has Bcc structure.

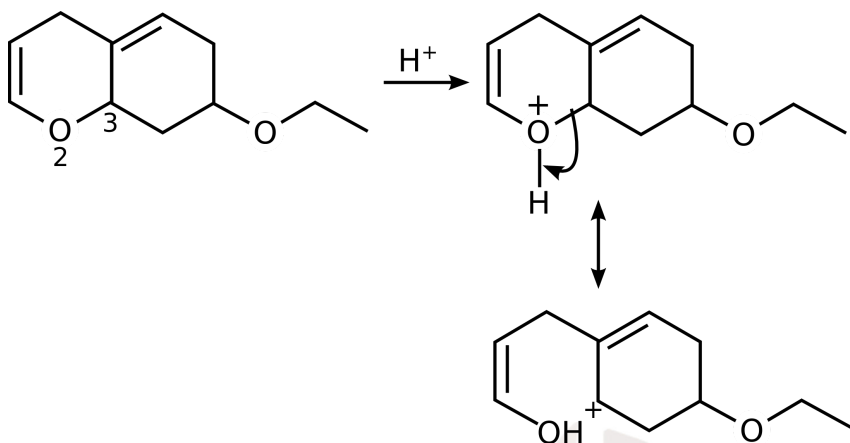
Cs ions from the simple cubic arrangement Cl^- ion occupy the cubic interstitial sites, each Cl^- ion has eight Cs^+ as its nearest neighbours.

16.

Difficulty : Medium

Topics :

Ethers,

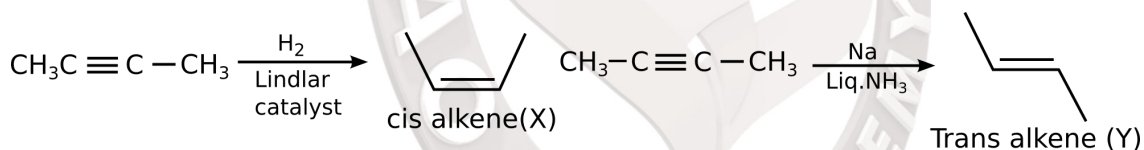


17.

Difficulty : Medium

Topics :

Alkynes,


 Dipole moment of X is more than Y

 Boiling point of X is more than Y

18.

Difficulty : Medium

Topics :

Colligative properties,

 $RLVP \propto \text{Molar mass of solvent}$ (If molality is same)

$$\frac{(RLVP)_X}{(RLVP)_Y} = \frac{M_X}{M_Y} = \frac{3}{4}$$

19.

Difficulty : Medium

Topics :

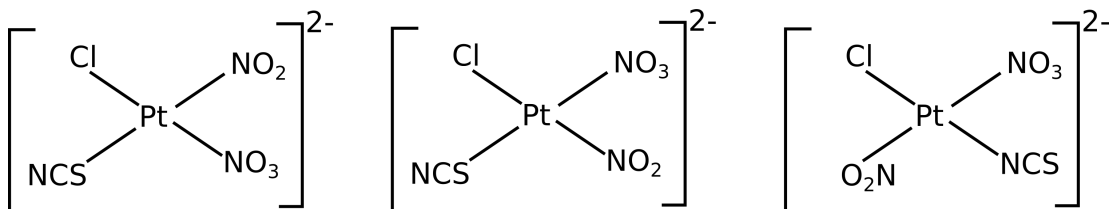
Coordination Compounds,

 Total number of possible isomers for square planar $[Pt(Cl)(NO_2)(NO_3)(SCN)]^{2-}$.

 $MABCD$ complex : 3 geometrical isomers

 NO_2 and SCN are ambidentate ligand

$$\text{total isomers} = 4 \times 3 = 12$$

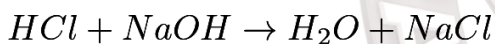


20.

Difficulty : Medium

Topics :

Ionic equilibrium,



$$(i) [H^+] = \frac{10}{100} \Rightarrow pH = 1$$

$$(ii) [H^+] = [OH^-] = 10^{-7} \Rightarrow pH = 7 \text{ Neutral}$$

$$(iii) [H^+] = \frac{2}{100} \Rightarrow pH = 2 - \log 2 = 2 - 0.3 = 1.7$$

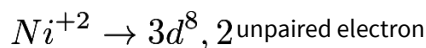
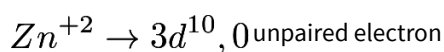
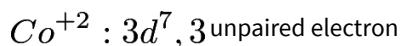
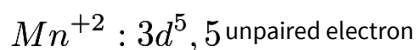
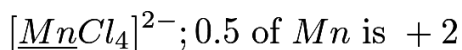
$$(iv) [H^+] = \frac{1}{100} \Rightarrow pH = 2$$

21.

Difficulty : Medium

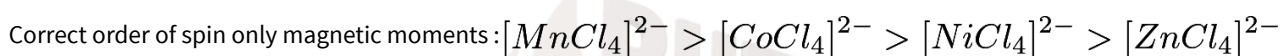
Topics :

d-block,



Spin magnetic moment

$$\mu = \sqrt{n(n+2)}$$

 $n \rightarrow$ Number of unpaired electron


22.

Difficulty : Medium

Topics :

Periodic Table,

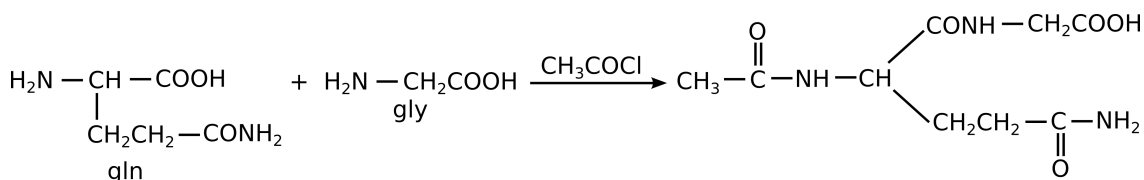
 The correct order of electron affinity is $Cl > F > O$.

23.

Difficulty : Medium

Topics :

BIOMOLECULES,



24.

Difficulty : Medium

Topics :

Surface Chemistry,

$$\frac{x}{m} = kP^{1/n}$$

$$\log \frac{x}{m} = \log k + \frac{1}{n} \log P$$

$$Y = mx + C$$

$$\text{Slope } m = \frac{1}{n}$$

25.

Difficulty : Medium

Topics :

Atomic Structure,

$$mvr = n \frac{h}{2\pi}$$

$$2\pi r = n \left(\frac{h}{mv} \right)$$

$$= n\lambda$$

 $\lambda \rightarrow$ de-Broglie's wavelength

 So for first Bohr orbit wavelength of electron = $2\pi r_1$

$$= 2\pi(0.529)\text{\AA}$$

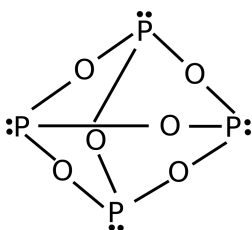
26.

Difficulty : Medium

Topics :

Chemical Bonding,

P-block,

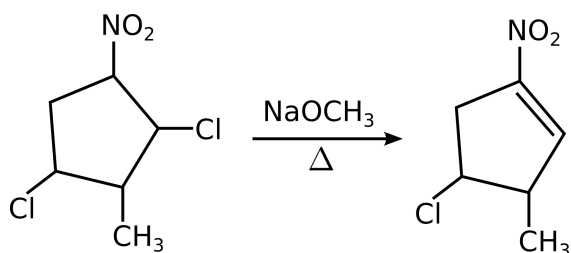
 The number of $P - O$ bonds in P_4O_6 is 12.


27.

Difficulty : Medium

Topics :

Alkyl halides,



28.

B

Difficulty : Medium

Topics :

Chemical Bonding,

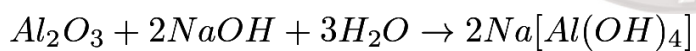

An antibonding π orbital

29.

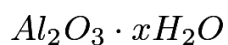
Difficulty : Medium

Topics :

Metallurgy,



(X)

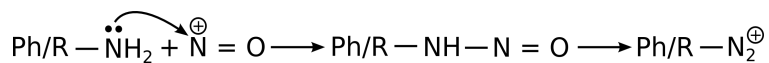
 $\downarrow CO_2$


30.

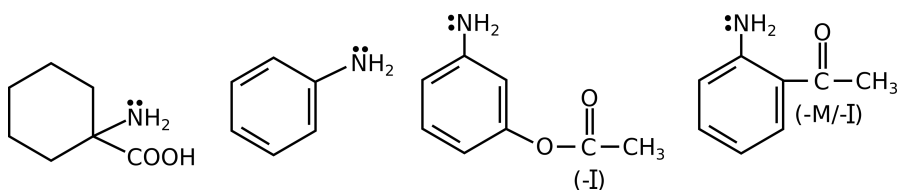
Difficulty : Easy

Topics :

Chemistry,



In diazotisation, aliphatic amine or aromatic amine act as nucleophile or base

BaHe strength or nucleophilicity of amine increases, then role of diazotisation increases.


Base strength or nucleophilicity ↑

Role of diazotisation ↑

