JEE MAIN SEP 2020 (MEMORY BASED) | 2ND SEP SHIFT-1

Note: The answers are based on memory based questions which may be incomplete and incorrect.

1. Which of the following is solid sol ?

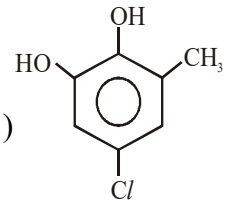
(1) Butter (2) paints (3) gem stone (4) cake

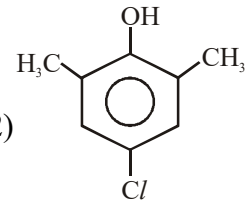
Ans. (3)

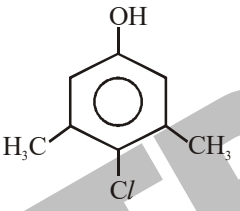
Sol. Solid sol has dispersed phase solid and dispersion medium solid.

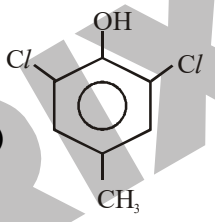
Example → Gem stones, some coloured glass

2. What is the structure of Dettol?

(1) 

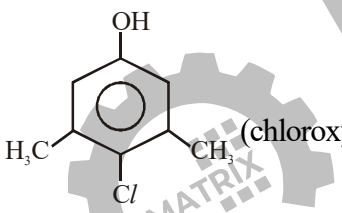
(2) 

(3) 

(4) 

Ans. (3)

Sol. Dettol is a mixture of chloroxylenol and terpineol.



(chloroxylenol)

3. Which method is used for the preparation of colloid ?

(1) Ostwald process (2) Bredig's arc method (3) Van Arkel method (4) Mond's process

Ans. (2)

Sol. Bredig's Arc method is used for preparation of colloidal sol's of less reactive metal like Au, Ag, Pt.

4. $Cu + Sn^{2+} \rightarrow Cu^{2+} + Sn$

for the above cell reaction $[Cu^{+2}] = [Sn^{+2}] = 1$ M

Given : ($E^{\circ}_{Cu^{2+}/Cu} = 0.34$ V, $E^{\circ}_{Sn^{2+}/Sn} = -0.16$ V)

Find $\Delta G = ?$ (in KJ)

sol. $\Delta G^{o} = -nFE^{o}_{redox}$

$\Delta G^{o} = -2 \times 96500 \times (-0.5)$

$= 96500$ J

$= 96.5$ KJ

Here,

$E^{o}_{redox} = E^{\circ}_{Sn^{+2}/Sn} - E^{\circ}_{Cu^{+2}/Cu}$

$= (-0.16)-(0.34)$

$= -0.50$ V

5. If a compound AB_4 is polar then its structure is :

(1) Square planar (2) Rectagular planar (3) Tetrahedral (4) Square pyramidal

sol. 4

(1) Square Planar Non Polar

(2) Recentagular Planar Non Polar

(3) Tetrahedral Non Polar

(4) Square Pyramidal Polar

6. Which of the following statement about ozone is incorrect ?

(1) Ozone acts as a protective layer against UV rays

(2) It is toxic layer and converts NO to NO_2

(3) It converts Cl free radical of CFC's to chlorinedioxide

(4) It acts as shield to our atmosphere

ans (3)

sol. In presence of sunlight CFC's molecule divides and release chlorine free radical give chlorine monoxide radical ($ClO^{\bullet}$) and oxygen

$$CF_2Cl_2(g) \xrightarrow{UV} \dot{C}l(g) + \dot{C}F_2Cl(g)$$
$$\dot{C}l(g) + O_3(g) \longrightarrow Cl\dot{O}(g) + O_2(g)$$
$$Cl\dot{O}(g) + O(g) \longrightarrow C\dot{l}(g) + O_2(g)$$

7. 5 moles of Ar and 3 moles of O_2 are mixed together. Find the total internal energy in term of RT.

sol. 15RT

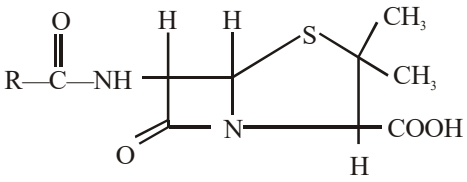
$$\Delta U = \frac{f}{2}nRT$$

For $O_2 \Rightarrow \Delta U = \frac{5}{2} \times 3(RT) = \frac{15}{2}RT$

For $Ar \Rightarrow \Delta U = \frac{3}{2} \times 5(RT) = \frac{15}{2}RT$

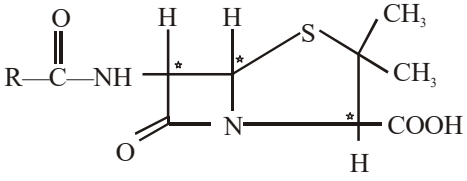
So sum of internal energy = 15 RT

8. Find the number of chiral centres in penicillin



General Structure of Penicillin

Ans. 3

Sol.  (☆ means chiral centre)

General Structure of Penicillin

9. Among the following properties, trend (in magnitude) of which property is different from other across a period ?

(1) Ionisation energy (2) Electronegativity (3) Electron gain enthalpy (4) Atomic radius

ans 4

sol. On moving left to Right along a period

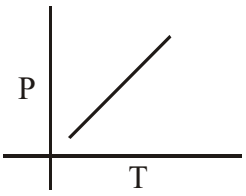
Atomic radius → decreases

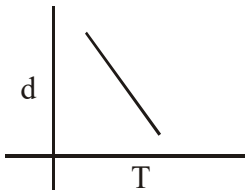
Electronegativity → Increases

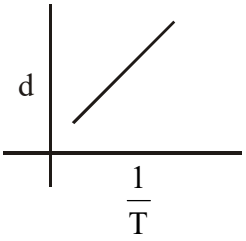
Electron gain enthalpy → Increases

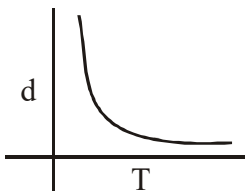
Ionisation enthalpy → Increases

10. Which of the following graph is incorrect for an ideal gas ?

(1) 

(2) 

(3) 

(4) 

ans 2

sol. For ideal gas

$PM = dRT$

$$d = \left[\frac{PM}{R}\right]\frac{1}{T}$$

So graph between d Vs T is not straight line.

11. On heating a compound A, a gas B is obtained which is found in environment. Which of the following will not give above gas :

(1) $Pb(NO_3)_2$ (2) NH_4NO_2 (3) $(NH_4)_2Cr_2O_7$ (4) $Ba(N_3)_2$

ans 1

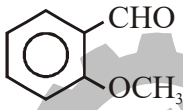
sol (1) $Pb(NO_3)_2 \rightarrow PbO_{(s)} + 2NO_{2(g)} + \frac{1}{2}O_2(g)$

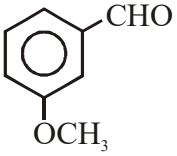
(2) $NH_4NO_2 \rightarrow N_{2(g)} + 2H_2O$

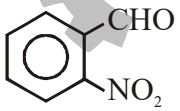
(3) $(NH_4)_2Cr_2O_7 \rightarrow Cr_2O_{3(s)} + N_{2(g)} + 4H_2O$

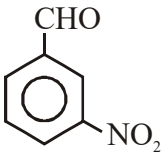
(4) $Ba(N_3)_2 \rightarrow Ba_{(s)} + 3N_{2(g)}$

12. Which of the following is most reactive towards HCN :

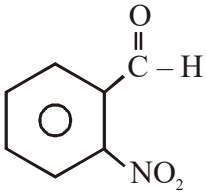
(1) 

(2) 

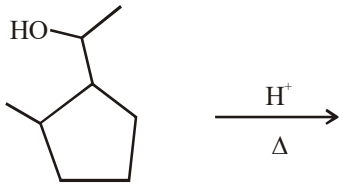
(3) 

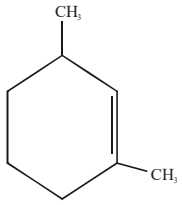
(4) 

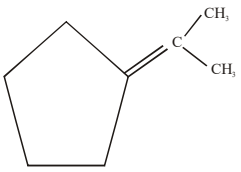
Ans. (3)

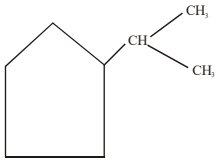
Sol. 

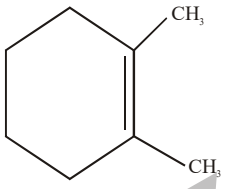
– R effect of NO_2 produces strong electrophilic centre on carbon of aldehyde group.

13. 

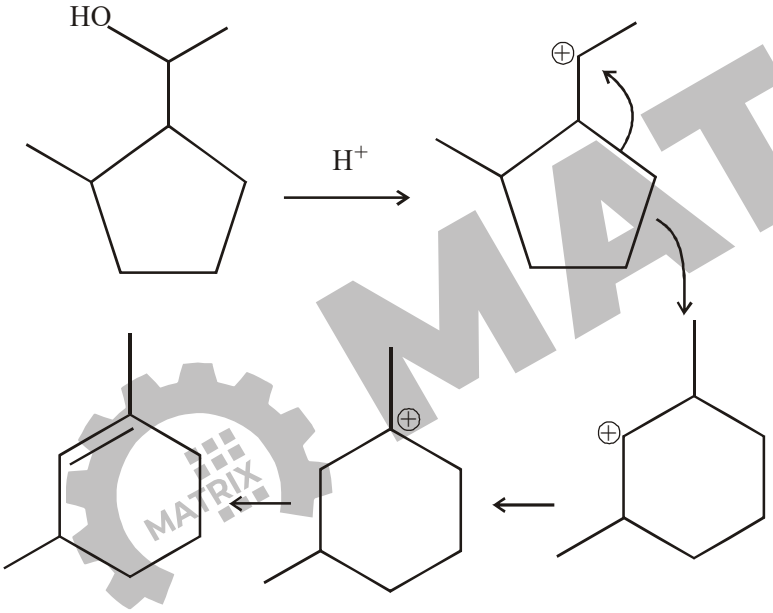
(1) 

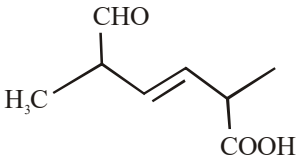
(2) 

(3) 

(4) 

Ans. (1)]

Sol. 

14.  Correct IUPAC name of following compound is :

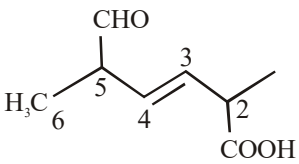
(1) 2-methyl-5-oxohex-3-enoic acid

(2) 5-formyl-2-methyl hex-3-enoic acid

(3) 2, 5-dimethyl-5-oxo pent-3- enoic acid

(4) 2, 5-dimethyl-5-formyl pent-3- enoic acid

Ans. (2)

sol. 

5-formyl-2-methyl hex-3-enoic acid

15. Which metal is used in Photo-Electric cell ?

(1) Li (2) Na (3) Rb (4) Cs

ans 4

sol Cesium has lowest ionisation enthalpy and hence it can show photoelectric effect to the maximum extent hence it is used in photo chemical cell.

16. Graph between $\log\left(\frac{x}{m}\right)$ Vs $\log P$ has a slope = 2 and intercept = 0.477. Find $\left(\frac{x}{m}\right)$ at pressure 4 atm.

[Given $\log 3 = 0.477$]

(1) 6 (2) 3 (3) 48 (4) 9

ans (3)

sol. $\left(\frac{x}{m}\right) = k(P)^{\frac{1}{n}}$

$\log\left(\frac{x}{m}\right) = \log k + \frac{1}{n}\log P$ Slope = 2

$\text{Slope} = \frac{1}{n} = 2$ So n = ½ logk = 0.477

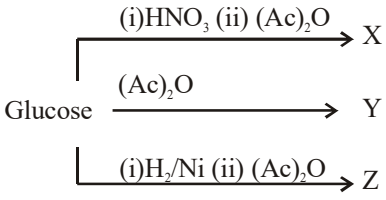
Intercept $\Rightarrow \log k = 0.477$ So k = Antilog (0.477) = 3 log P

So $\left(\frac{x}{m}\right) = k\left(P\right)^{\frac{1}{n}}$

$= 3[4]^2$

= 48

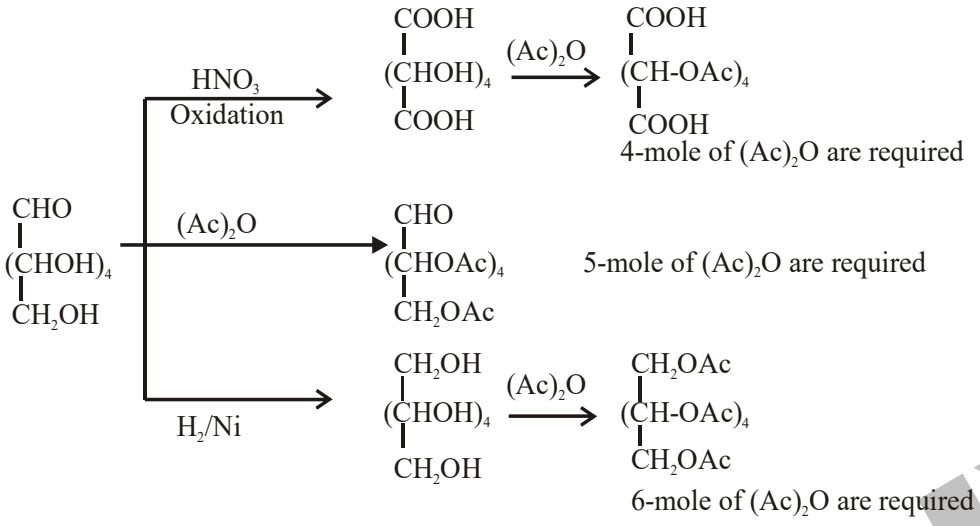
17.



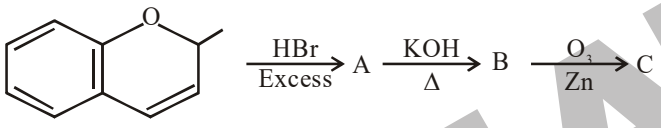
Calculate required moles of $(Ac)_2O$ in X, Y, Z product formation.

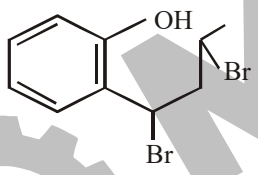
(1) 2,3,4 (2) 5,5,5 (3) 4,5,6 (4) 5,5,6

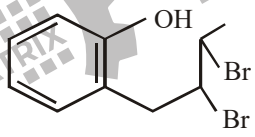
Sol. 3

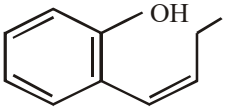


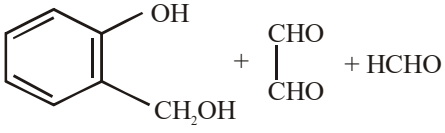
18. Find out correct statement regarding this reaction ?



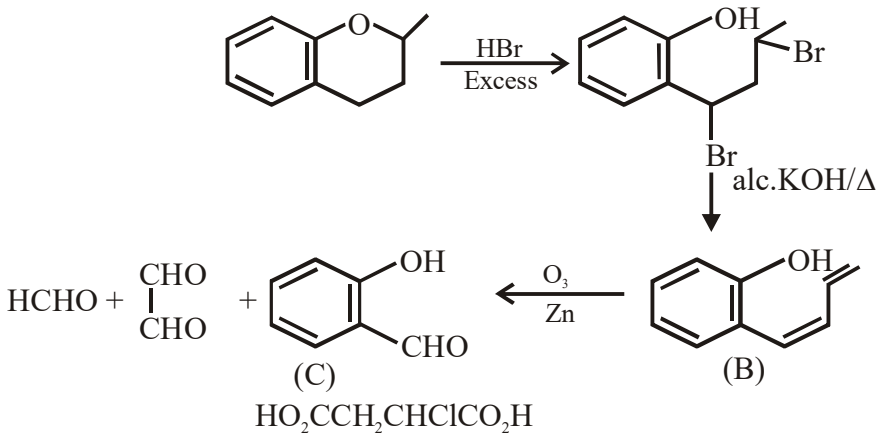
(1) Product A is 

(2) Product A is 

(3) Product B is 

(4) Product B is 

sol. 1



19. Assertion : Cu^{2+} react with sulphide ion very quickly to give a solid

Reason : $Cu^{2+} + S^{2-} \rightleftharpoons$ CuS, its equilibrium const. is very high because solubility product is very low.

(1) Assertion and reason both are correct and reason is correct explanation for Assertion

(2) Assertion and reason both are correct and reason is not a correct explanation for Assertion

(3) Assertion is correct but Reason is incorrect.

(4) Both Assertion and Reason are incorrect.

sol. 1

$Cu^{2+} + S^{2-} \rightleftharpoons$ CuS (black ppt), the solubility product of CuS is very low therefore equilibrium shifted in forward direction.

20. Sum of Oxidation state of Fe in given complex compound

Fe_2CO_9, $Na_4[Fe(NOS)(CN)_5]$, $Na_4[FeO_4]$

sol. 6

0 +2 +4

Fe_2CO_9, $Na_4[Fe(NOS)(CN)_5]$, $Na_4[FeO_4]$

0 + 2 + 4 = 6

21. Calculate ΔU (change of internal energy in kJ) for the vapourisation of 90 g water at 100ºC.

given ΔH_{vap} = 41 kJ/mol and R = 8.314

sol. 189.5 kJ

$H_2O(l) \rightarrow H_2O(g)$ (for 1 mol)

$\Delta n_g = 1$, $\Delta H = 41$ kJ

$\Delta H = \Delta U + \Delta n_g RT$

$\Delta U = \Delta H - \Delta n_g RT = 41 - 1 \times 8.314 \times 373 \times 10^{-3}$

$\Delta U = 41 - 3.1 = 37.9$

For 90 gm water (5 mol)

$\Delta U = 37.9 \times 5 = 189.5$

22. What is the product of reaction of ammonia with bleaching powder.

(1) N_2 (2) $NH_2–Cl$ (3) $NH_2–NH_2$ (4) NCl_3

Ans. (1)

Sol. $NH_3 + CaOCl_2 \rightarrow CaCl_2 + 3H_2O + N_2$

23. Which of the following molecule undergo retention after nucleophilic attack by OH^- ?

(1) $CH_3–\underset{\displaystyle CH_3}{\underset{|}{CH}}–Br$ (2) $CH_3–\underset{\displaystyle C_6H_5}{\underset{|}{CH}}–Br$ (3) $CH_3–\underset{\displaystyle CH_3}{\underset{|}{CH}}–CH_2–Br$ (4) CH_3Br

Ans. (2)

sol. Only 2nd option molecule is chiral.