Regd. Office **:** Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

Chemistry JEE Solutions 2022

Chemistry

1. Which of the following is a stable nitrogen halide.

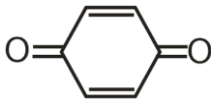
(1) NF_3 (2) NCl_3

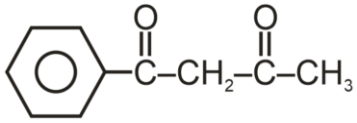
(3) NBr_3 (4) NF_3

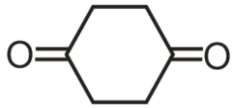
Sol. Answer (1)

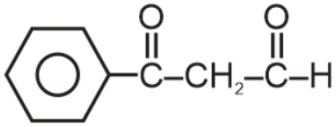
NF_3 forms most stable halide due to small size of fluorine and nitrogen, the overlapping is very high.

2. Which is conjugated dione?

(1) 

(2) 

(3) 

(4) 

Sol. Answer (1)

Conjugated dione is dicarbonyl compound with resonance with double bond.

Is a conjugated dione

3. Match the are correctly with their formula?

(A) Calamine (P) PbS

(B) Galena (Q) $ZnCO_3$

(C) Sphalerite (R) $FeCO_3$

(D) Siderite (S) ZnS

(1) A→P, B→Q, C→R, D→S

(2) A→Q, B→P, C→S, D→R

(3) A→Q, B→P, C→R, D→S

(4) A→P, B→Q, C→S, D→R

Sol. Answer (2)

(A) Calamine (Q) $ZnCO_3$

(B) Galena (P) PbS

(C) Sphalerite (S) ZnS

(D) Siderite (R) $FeCO_3$

4. Which of the following is correct statement

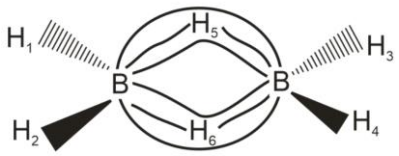
(1) B_2H_6 is Lewis acid

(2) All B-H bond in B_2H_6 are equal

(3) B_2H_6 has planar structure

(4) Maximum no. of hydrogen in one plane is 6.

Sol. Answer (1)



Both Boron B & 4 hydrogen are in same plane & H_5, H_6 are in plane perpendicular to this.

Boron is still e^- deficient So B shows reaction with various Lewis basis like NH_3.

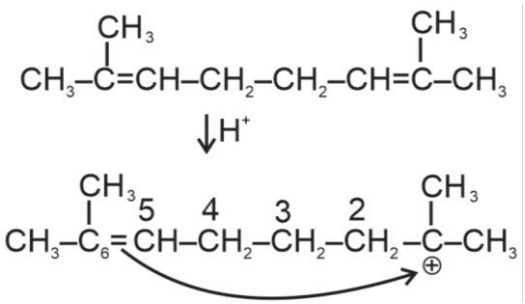
5. 2.7 dimethyl-2,6-octadiene $\xrightarrow[\Delta]{H^+}$ A

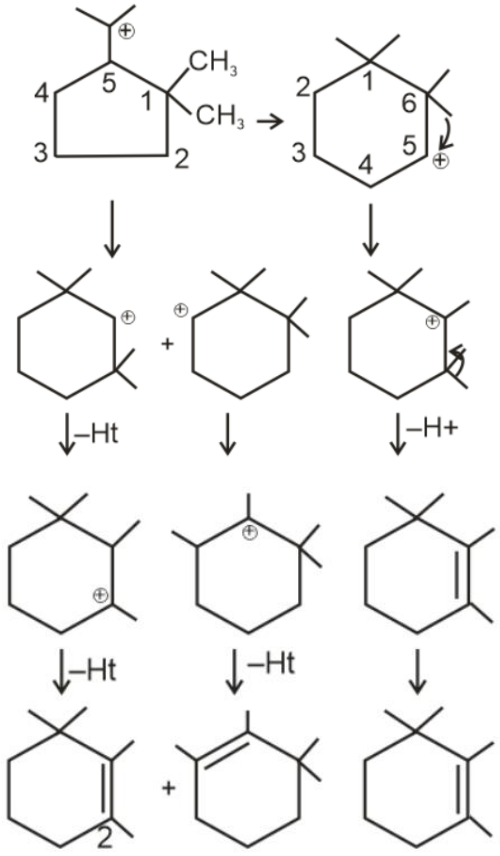
Find the number of sp^2 hybridized carbon in the product 'A'?

(1) 2 (2) 4

(3) 6 (4) 5

Sol. Answer (1)





No. of sp^2 carbon is 2, so option 1 is correct.

6. Which of the following is polyester?

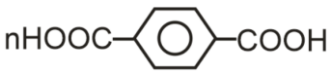
(1) Dacron (2) Polyethene

(3) Teflon (4) DNA

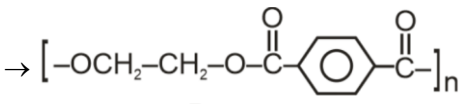
Sol. Answer (1)

$nHOCH_2–CH_2–OH$ +

Ethane-1,2,diol



Terepthalic acid



Dacron

$$n\underset{\text{Ethene}}{CH_2 = CH_2} \longrightarrow \underset{\text{Polyethane}}{(-CH_2 - CH_2-)_n}$$

$$nCF_2 = CF_2 \longrightarrow \underset{\text{Teflon}}{(-CF_2 - CF_2-)_n}$$

DNA contain phosphodiester linkage option 1 is correct

7. Which of the following have maximum melting point?

(1) Acetic acid (2) Formic acid

(2) Propanoic acid (4) Butanoic acid

Sol. Answer (1)

(Fact based)

8. Find the difference in oxidation number of chromium in chromate s dichromate.

(1) 4 (2) 6

(3) 0 (4) 2

Sol. Answer (3)

$$\underset{\text{Chromate}}{CrO_4^{2-}} \longrightarrow \frac{0.S}{+6}$$

$$\underset{\text{(dichromate)}}{Cr_2O_7^{2-}} \longrightarrow +6$$

9. In the production of which of the following compound, H_2 (Hydrogen gas) is used?

(1) CO_2 (2) NH_3

(3) P_4 (4) SO_2

Sol. Answer (2)

$$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$$

In the production of NH_3, H_2 is used.

10. Among LiF and $MgCl_2$, which is more soluble is ethanol.

(1) LiF more soluble in ethanol

(2) $MgCl_2$ is more soluble in ethanol

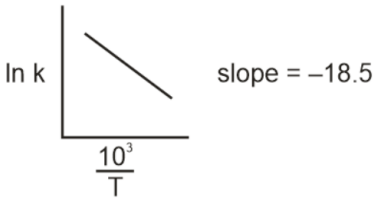
(3) Both are equally soluble in ethanol

(4) Both are not soluble in ethanol.

Sol. Answer (2)

$MgCl_2$ to has more covalent character than LiF, due to which, it is more soluble in Ethanol.

11. What is the value of E_a for the given graph (in KJ)



(1) 190.6 (2) 253.55

(3) 153.55 (4) 89.5

Sol. $\ln k = \ln A - \frac{E_a}{RT} \times \frac{10^3}{10^3}$

$$\frac{E_a}{R \times 10^3} = 18.5$$

$$E_a = \frac{18.5 \times 8.314}{1000} \times 10^3$$

$$= 153.55$$

12. Which has minimum role in formation of photochemical smog?

(1) HCHO (2) N_2

(3) NO (4) O_3

Sol. N_2 gas has minimum role in formation of photochemical smog.

Fact based

13. Which of the following vitamin cannot be given to the living organism through food?

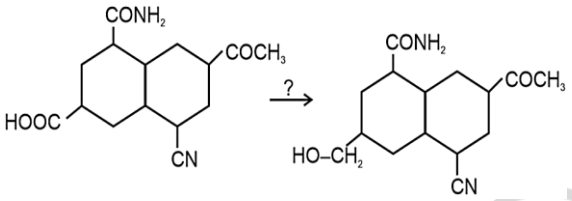
(1) C (2) K

(3) D (4) B_5

Sol. Answer (3)

Precursor of vitamin D is already present in the body and with the help of sunlight vitamin D is produced in body.

14. The most suitable reagent for the given conversion is



(1) $LiAlH_4$ (2) $NaBH_4$

(3) H_2/Pd (4) B_2H_6

Sol. Answer (4)

$LiAlH_4$ will reduce – $CONH_2$, $-\overset{O}{\overset{\|}{C}}-$, –CN and – COOH.

$NaBH_4$ does not reduce –COOH, $-\overset{O}{\overset{\|}{C}}-$, $-NH_2$

H_2/Pd will reduce $-\overset{O}{\overset{\|}{C}}-$, & –CHO at faster rate in comparison to $-CONH_2$. It does not reduce – COOH.

B_2H_6 reduces –COOH easily. It reduces –CN also but the rate of –COOH reduction is very fast.

Option (4) is correct answer

15. Two isomers can be metamers if they have

(1) Different functional group

(2) Carbon skeleton is different

(3) Number of carbon atom on either side of group are different

(4) Different molecular formula

Sol. Answer (3)

Two isomers are called metamers If they have different alkyl group on either side of functional group.

So option 3 is correct.

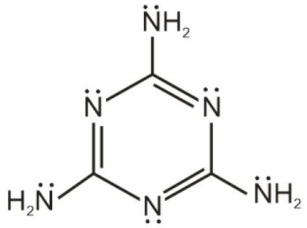
16. Find the number of lone pair in melamine structure?

(1) 2 (2) 3

(3) 9 (4) 6

Sol. Answer (4)

Melamine is



Number of lone pair is 6

Option 4 is correct

17. A gaseous phase reaction

$$A(g) \rightleftharpoons B(g) + \frac{1}{2}C(g)$$

Find the relation between K(equilibrium constant), α(degree of dissociation) and equilibrium pressure (p).

(1) $k = \dfrac{\alpha^{3/2}P^{1/2}}{(1-\alpha)(2+\alpha)^{1/2}}$

(2) $k = \dfrac{\alpha^{3/2}P^{1/2}}{1-\alpha^2}$

(3) $k = \dfrac{\alpha^2 P}{1-\alpha^2}$

(4) $k = \dfrac{\alpha^3 P^{1/2}}{1-\alpha^2}$

Sol. Answer (1)

$$A_{(g)} \rightleftharpoons B_{(g)} + \frac{1}{2}C_{(g)}$$

$1-\alpha \quad \alpha \quad (\alpha/2)$

$$K_p = \frac{\left(\dfrac{\alpha}{1+\dfrac{\alpha}{2}}\right)P \times \left(\dfrac{\alpha/2}{1+\alpha/2}\right)^{\frac{1}{2}} P^{1/2}}{\left(\dfrac{1-\alpha}{1+\alpha/2}\right)P}$$

$$\Rightarrow \frac{\alpha^{3/2}P^{1/2}}{2^{1/2}\left(1+\dfrac{\alpha}{2}\right)^{1/2}(1-\alpha)} = \frac{\alpha^{3/2}P^{1/2}}{(2+\alpha)^{1/2}(1-\alpha)}$$

18. Find the number of amphoteric oxides in the given compounds?

Na_2O, Cl_2O_7, As_2O_3, N_2O,NO

(1) 1 (2) 3

(3) 2 (4) 5

Sol. Answer (1)

N_2O & NO — Neutral oxide

$Na_2O + H_2O \rightarrow 2NaOH$ ($\therefore$ Na_2O is basic oxide)

$Cl_2O_7 + H_2O \rightarrow 2HClO_4$ ($\therefore Cl_2O_7$ is acidic oxide)

$$As_2O_3 + 6HCl \rightarrow 2AsCl_3 + 3H_2O$$
$$As_2O_3 + NaOH \rightarrow Na_3AsO_3$$

($\therefore$ As_2O_3 is amphoteric oxide)

19. The process of removing sulphur from the sulphide ore is?

(1) Roasting (3) Calcination

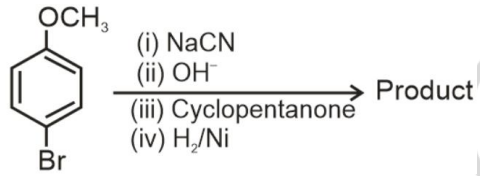
(3) Leaching (4) Zone refining

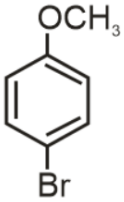
Sol. Answer (1)

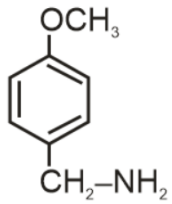
The sulphur present in the ore is heated in the presence of excess amount of oxygen/air and forms SO_2 which is eliminated in the form of gas and the metal sulphide gets converted to metal oxide

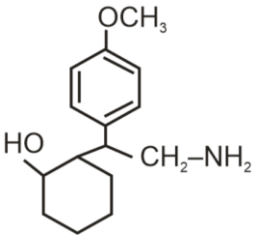
$$M_2S_x + \left(\frac{3x}{2}\right)O_2 \longrightarrow M_2O_x + xSO_{2(g)}$$

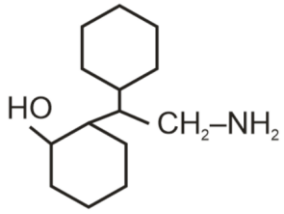
20. The product in the following sequence of reaction is?



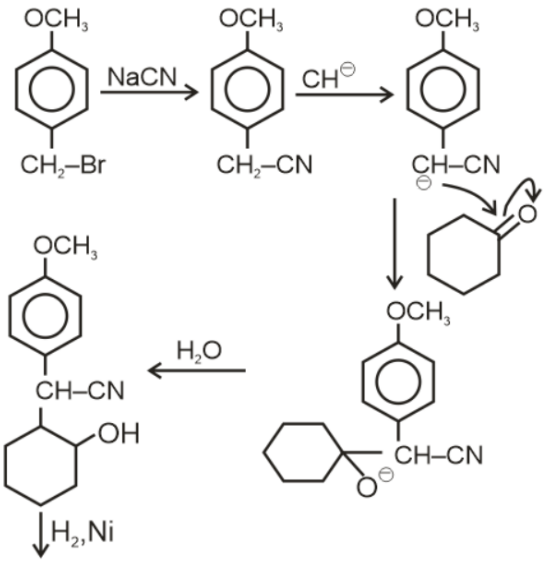
(1) 

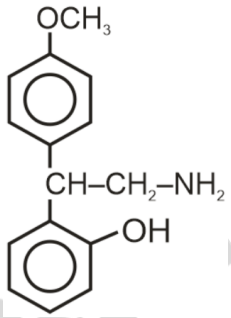
(2) 

(3) 

(4) 

Sol. Answer (3)

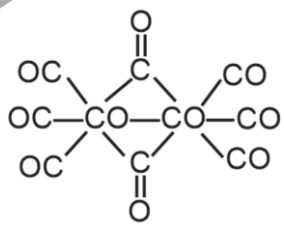




21. In the structure of $(CO)_2(CO)_8$, x is Co-Co bonds and y is number of Co-Co terminal bonds. Then find the value of x + y?

Sol. Answer (7)

The structure of $[CO_2(CO)_8]$ is



$\therefore$ x = no. of Co-Co bonds = 1

Y = no. of terminal Co-Co bonds = 6

x + y = 1 + 6 = 7

22. In a lattice atom "X" occupied all the lattice point of HCP and "Y" is present in all the tetrahedral voids. Then formula of lattice will be?

(1) X_2Y (2) XY_2

(3) XY_3 (4) X_2Y_3

Sol. Answer (2)

In a lattice

X occupy all ph, g HCP = 6

Y all tetrahedral void = 12

X_6Y_{12}

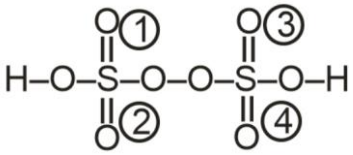
23. Number of π-bond in marshall acid is?

(1) 2 (2) 6

(3) 4 (4) 8

Sol. Answer (3)

Marshall's Acid = $H_2\overset{+6}{S}_2O8$



There are 4 π bonds in marshall's acid

24. Which of the following is not a broad spectrum antibiotic.

(1) Amoxicillin (b) Ofloxacin

(3) Penicillin (4) Chloramphenicol

Sol. Answer (3)

Penicillin is not a broad spectrum antibiotic.

25. Enamel does not contain which of the following ion?

(1) P^{+5} (2) P^{+3}

(3) P^{-} (4) Ca^{2+}

Sol. Answer (2)

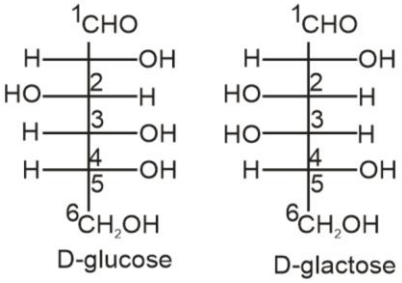
The F^- ions make the enamel on teeth much harder by converting hydroxy apatite, $[3(Ca_3(PO_4)_2.\ Ca(OH)_2]$, the enamel on the surface into much harder fluorapatite, $[3(Ca_3(PO_4)_2.CaF_2]$ So, P^{+3} is not present in enamel.

26. Glactose is which of the following epimer of glucose

(1) G-epimer (2) C_2-epimer

(3) C_3-epimer (4) C_4-epimer

Sol. Answer (4)



Glactose is a C_4-epimer of glucose

27. **Question:** Statement I: Emulsion of water and oil is unstable and separates in two layers. **Statement 2**: It is stabilized by added excess electrolytes.

(1) Both SI and S2 arc correct.

(2) SI is correct but S2 is incorrect.

(3) SI is incorrect but S2 is correct.

(4) Both SI and S2 arc incorrect.

Sol. Answer: (2)

Emulsions of oil in water is of immiscible solvents So, for stabilization of an emulsion, a third component called emulsifying agent is usually added.

28. Which metal burns with green flame, blue from centre ?

(1) Fe^{2+} (2) Cu^{2+}

(3) Fe^{3+} (4) Al^{3+}

Ans. Answer (2)

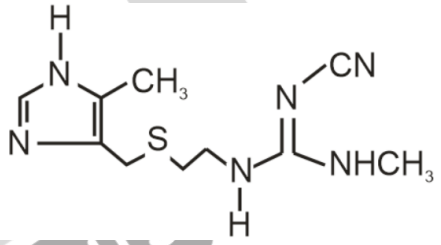
29. What is the name of the given structure?

(1) Ranitidine

(2) Cimetidine

(3) Histamine

(4) Terfenadine



Sol. Answer (2)

30. **Statement I:** π bond makes the compound unstable.

Statement II: Bond strength of C = C (double bond) is more than C – C (single bond)

a. S1 and S2 both are correct and S2 is correct explanation of S1

b. S1 and S2 both are correct and S2 is not correct explanation of S1

c. S1 is false and S2 is correct

d. S1 is correct and S2 is false

Sol. Answer (3)

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