

# JEE Main 2021 August 27 Shift 2 Chemistry

1.

Column-I Ore	Column-II Formula
(i) Calamine	(a) $ZnCO_3$
(ii) Siderite	(b) $CuCO_3 \cdot Cu(OH)_2$
(iii) Malachite	(c) $FeCO_3$
(iv) Cerussite	(d) $PbCO_3$

Identify the correct match.

(A)  $i - a, ii - c, iii - b, iv - d$

(B)  $i - a, ii - b, iii - c, iv - d$

(C)  $i - a, ii - d, iii - b, iv - c$

(D)  $i - d, ii - c, iii - b, iv - a$

Ans. (A)

Sol. (i) Calamine :  $ZnCO_3$

(ii) Siderite :  $FeCO_3$

(iii) Malachite :  $CuCO_3 \cdot Cu(OH)_2$

(iv) Cerussite :  $PbCO_3$

2. When red phosphorus is heated in a sealed tube at 803 K, then

(A)  $\alpha$  -black phosphorus is formed

(B)  $\beta$  -black phosphorus is formed

(C) white phosphorus is formed

(D) No effect

Ans. (A)

Sol. When red phosphorus is heated in a sealed tube at 800 K, then  $\alpha$  -black phosphorus is formed.

3. Coordination number of Fe in  $K_4[Fe(CN)_6]$  is

Ans. 6

Sol.  $K_4[Fe(CN)_6]$  Coordination of Fe = 6 because the number of sigma bonds formed by Fe with the monodentate ligands is 6.

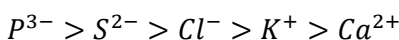
4. Correct order of ionic radius of species  $P^{3-}$ ,  $S^{2-}$ ,  $Cl^-$ ,  $Ca^{2+}$ ,  $K^+$  is:

- (1)  $P^{3-} > S^{2-} > Cl^- > Ca^{2+} > K^+$
- (2)  $P^{3-} > S^{2-} > Cl^- > K^+ > Ca^{2+}$
- (3)  $P^{3-} > Cl^- > S^{2-} > K^+ > Ca^{2+}$
- (4)  $S^{2-} > P^{3-} > Cl^- > Ca^{2+} > K^+$

Sol.(2)

	$P^{3-}$	$S^{2-}$	$Cl^-$	$K^+$	$Ca^{2+}$
Z	15	16	17	19	20
No. of $e^-$	18	18	18	18	18

For isoelectronic species, greater is the value of Z, smaller is the value of radius because the value of screening constant is the same when the number of electrons are the same. So, correct order of radius is:



5. On heating  $KMnO_4$ , the product formed is:

- (A) Paramagnetic and colourless
- (B) Paramagnetic and Red colour
- (C) Paramagnetic and Green colour
- (D) Paramagnetic and colour

Ans. (C)



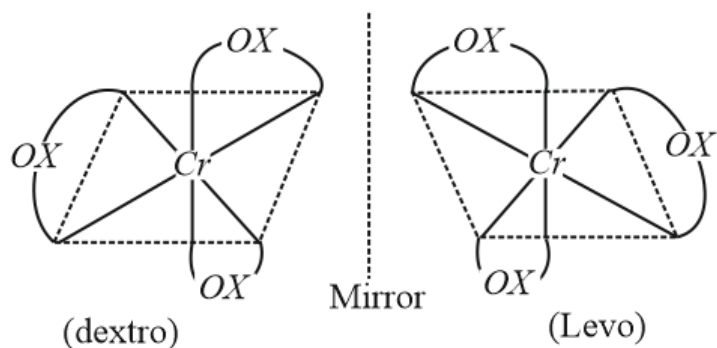
Purple                  Green

(Diamagnetic) (Paramagnetic)

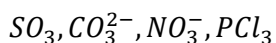
6. How many total optical isomers are possible for complex  $[Cr(C_2O_4)_3]^{3-}$

Ans. 2

Solution: Complex  $[Cr(C_2O_4)_3]^{3-}$  is  $[M(AA)_3]$  type complex. It is optically active due to the presence of non-superimposable mirror images which are also called enantiomers. Thus, the total number of optical isomers are 2. The structures are given below



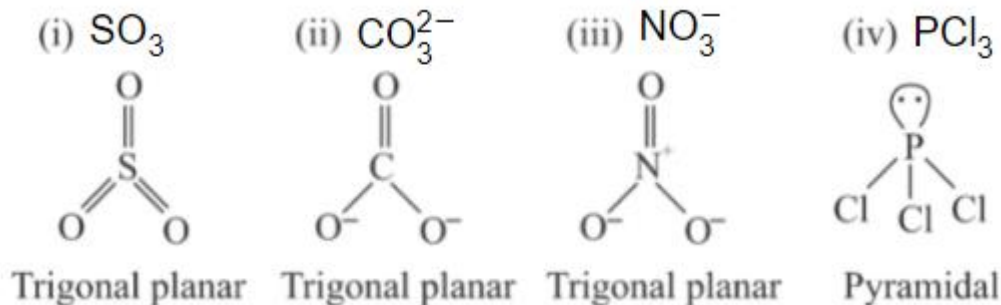
7. How many of the following species have non pyramidal geometry?



Ans. 3

Solution:

Those molecules in which the central atom is having three bond pairs and one lone pair are pyramidal in shape, and those molecules in which central atom having three single bond pairs and zero lone pairs are

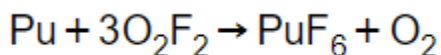


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8. Which of the following compounds is used to remove plutonium from spent nuclear fuel?

Ans. 2

Sol.  $O_2F_2$  oxidise plutonium to  $PuF_6$  and the reaction is used to remove the plutonium as  $PuF_6$  from spent nuclear fuel.



9. Why Lyophilic sols are more stable than Lyophobic sols.

(A) Do not have charge on particles.

(B) Because there is strong electrostatic repulsion between the negative charge particles.

(C) They are solvated.

(D) They have negative charge.

Ans. (C)

The stability of lyophilic sols is a result of two factors, the presence of a charge and the solvation of colloidal particles. On the other hand, the stability of lyophobic sols is only because of the presence of a charge. Thus, the lyophilic sol is more stable than lyophobic sol due to the extensive solvation.

10. Which of the following gives  $H_2O_2$  on hydrolysis?

(A)  $Na_2O_2$

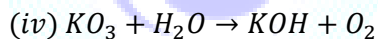
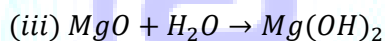
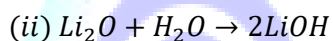
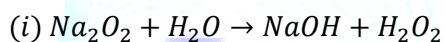
(B)  $Li_2O$

(C)  $MgO$

(D)  $KO_3$

Ans. (A)

Sol. Peroxides on hydrolysis will give hydrogen peroxide



11.  $Cr^{3+} + NaOH \rightarrow X$  (Precipitate) Then X is :

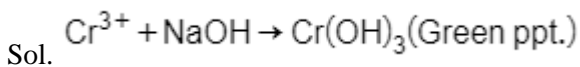
(A)  $Cr(OH)_3$

(B)  $Cr(OH)_4$

(C)  $Cr_2O_3$

(D)  $CrO$

Ans. (A)



12. In hydrogen like atom an electron is present in excited state 6, then maximum number of spectral lines formed, when the electron makes transition from excited state to ground state.

Ans. 6

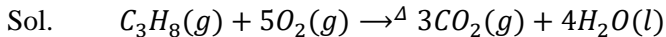
Sol.  $p^{\text{th}}$  excited state implies that electron is present in  $(p+1)^{\text{th}}$  state

Excited state = 6 so, electron is present in  $n=7$

Maximum spectral line formed  $= (n-1) = 6$

13. When 88g of propane reacts with 640g of oxygen then find the mole fraction of  $CO_2$  in resultant gaseous mixture.

Ans. (0.375)



Weight (g) 88      640

Mole  $\frac{88}{46} = 2$        $\frac{640}{32} = 20$

*Limiting reagent* =  $C_3H_8$

Mole  $2 - 2 = 0$        $20 - 10 = 10$       6

Total mole in gaseous mixture after reaction =  $10 + 6 = 16$

Mole fraction of  $CO_2 = \frac{6}{16} = 0.375$

14. Which of the following tests do not involve copper metal in their reaction.

(A) Seliwanoff Test

(B) Barfoed Test

(C) Fehling Test

(D) Biurate Test

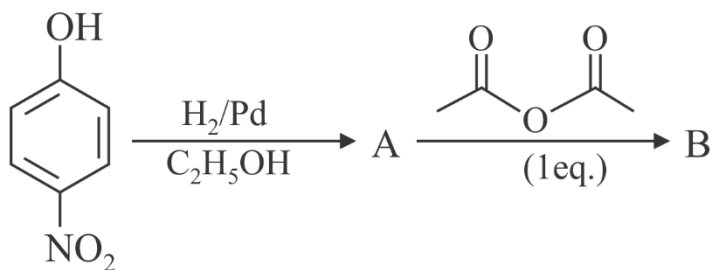
Ans. (A)

Seliwanoff Test: This test is used to detect the presence of Ketohexose rather than aldohexose. Reagent : resorcinol + conc. HCl.

Barfoed Test : It is used to detect Monosaccharide by Reduction of Cu(II) into Copper (I).

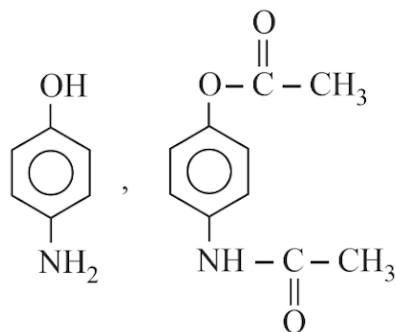
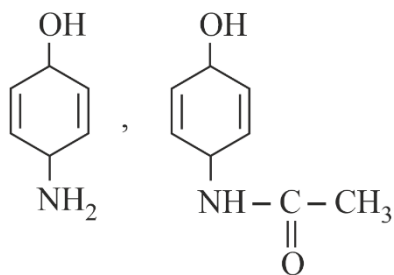
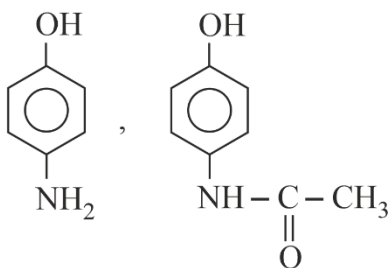
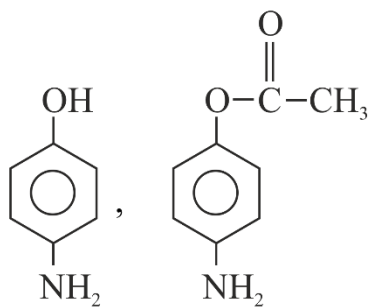
Fehling Solution: It is used to detect aldehyde than Ketone by reducing Cu(II) into Cu(I).

Biurate Test : Use to detect presence of peptide bond, Protein by reduction of Cu(II) into Cu(I).



15.

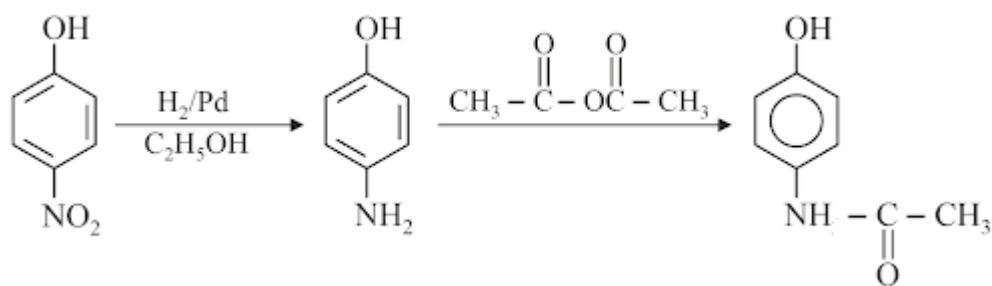
Identify A and B.



(D)

Ans. (B)

EMBIBE



Sol.

16. The major product obtained on the hydrolysis of sucrose.

- (A)  $\alpha$  - D Glucose +  $\alpha$  - D Glucose
- (B)  $\alpha$  - D Glucose +  $\beta$  - D Fructose
- (C)  $\alpha$  - D Glucose +  $\alpha$  - D Fructose
- (D)  $\alpha$  - D Fructose +  $\beta$  - D Fructose

Ans. (B)

Sol. Sucrose is a disaccharide of  $\alpha$ -Glucose and  $\beta$ -Fructose. So on hydrolysis we obtain  $\alpha$  -Glucose and  $\beta$ -Fructose.

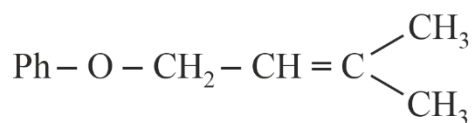
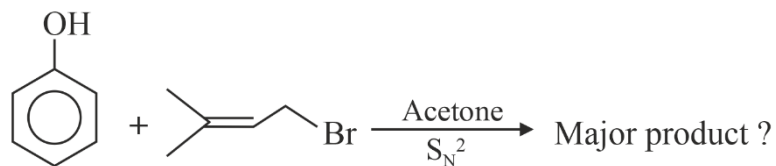
17. What is *pH* of rain water?

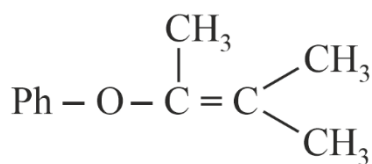
- (A) 5.6
- (B) 7.6
- (C) 6.6
- (D) 4.6

Ans. (A)

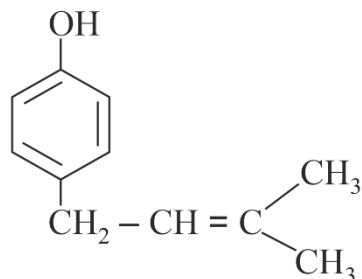
Sol. Normal rainwater has a *pH* of 5.6 (slightly acidic). This is because it is exposed to the carbon dioxide in the atmosphere. The carbon dioxide gets dissolved in the rainwater and forms carbonic acid.

18. In this following  $\text{S}_{\text{N}}^2$  reaction which product will be.

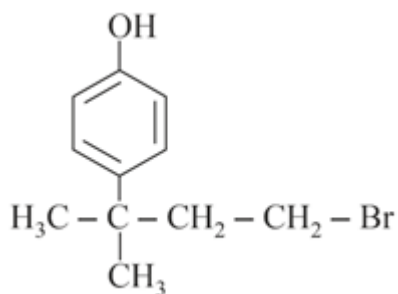




(B)

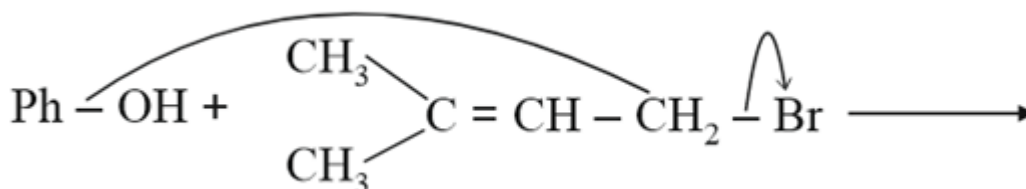


(C)



(D)

Ans. (A)



Sol.

19. Statement-1: Ethyl pent-3-ynoate react with  $\text{CH}_3\text{MgBr}$  then we will get  $3^\circ$  alcohol as a main product.

Statement-2: 1 mole of ethyl pent-3-ynoate use 2 mole of  $\text{CH}_3\text{MgBr}$  to produce  $3^\circ$  alcohol.

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.

(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.

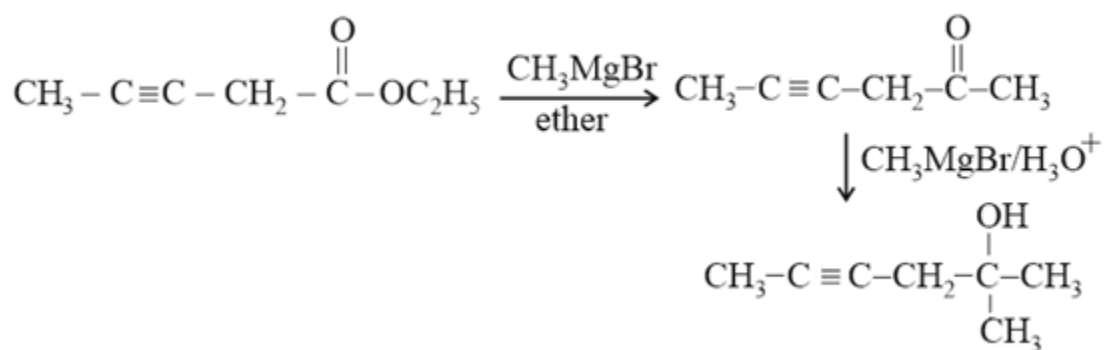
(C) Statement -1 is True, Statement-2 is False.

(D) Statement - 1 is False, Statement-2 is False.

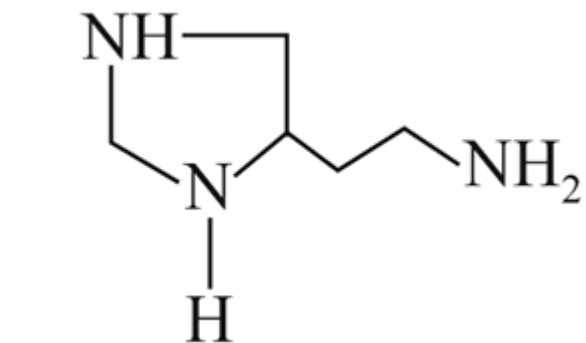
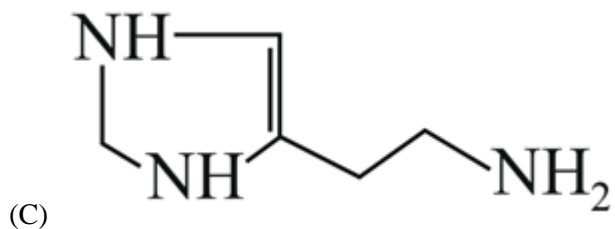
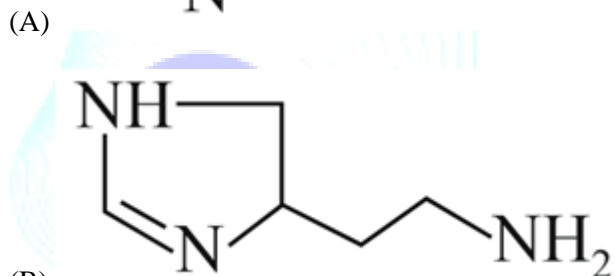
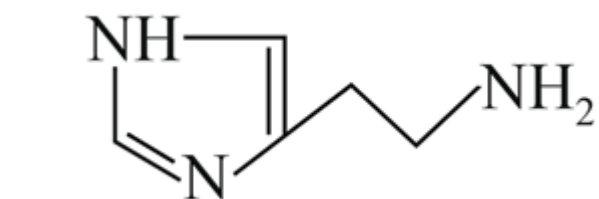
Ans. (A)

Sol. Statement-1, correct Statement-2 is also correct and correct Explanation.





20. Structure of compound which is responsible for acidity in stomach & stomach disorder.



(D)

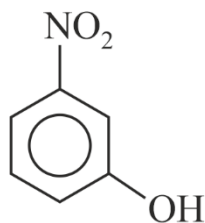
Ans. (A)

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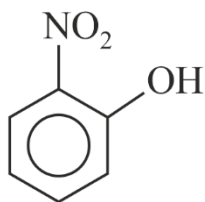


Sol. Histamine disorder.

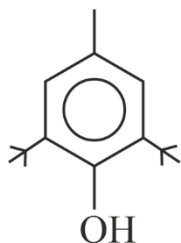
is responsible for acidity in stomach and stomach



(a)



(b)



(c)

21.

In which of the following intramolecular H-bonding possible

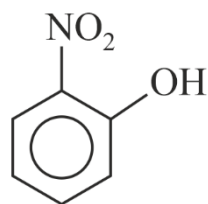
(A) *a* & *b* only

(B) only *b*

(C) *a*, *b*, & *c*

(D) *a* and *c* only

Ans. (B)



Sol.

EMBIBE