

JEE Main 2021(August) Paper

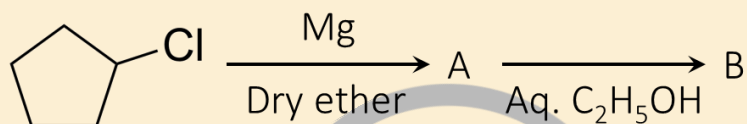


Date of Exam: 27th August 2021

Time: 9:00 a.m.-12 a.m.

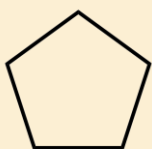
Subject: Chemistry

1.

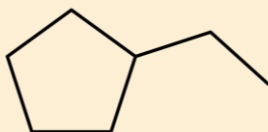


Find B.

a)



b)



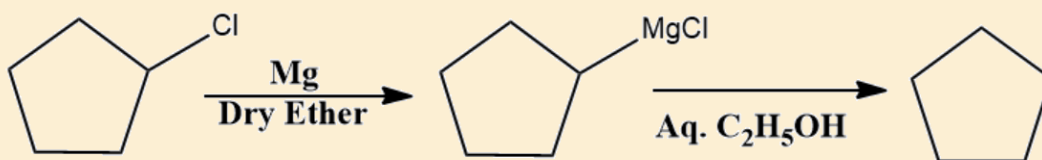
c)



d) None of these

Ans: (a)

Solution:



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Hence, option (a) is the correct answer.

2. Metal having much low melting point is refined by:

- a) Liquation
- b) Electrolytic refining
- c) Zone Refining
- d) None of these

Ans: (a)

Solution:

Liquification:

In this method a low melting metal like tin can be made to flow on a sloping surface. In this way it is separated from higher melting impurities. This process is used for the purification of Sn and Zn, and for removing Pb from Zn-Ag alloy.

Hence, option (a) is the correct answer.

3. From 0.2 gm of compound, 0.188 gm of AgBr is formed by Carius Method. Find % of Br?

- a) 80%
- b) 20%
- c) 40%
- d) 10%

Ans: (c)

Solution

Molar mass of AgBr = $(108+80)$ g/mol = 188 g/mol

188g of AgBr contains 80 g of Br

0.188 g of AgBr will contain $\frac{80 \times 0.188}{188}$ g Br

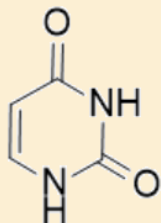
In 0.2 g of compound % of Br = $\frac{80 \times 0.188}{188 \times 0.2} \times 100\% = 40\%$

Hence, option (c) is the correct answer.

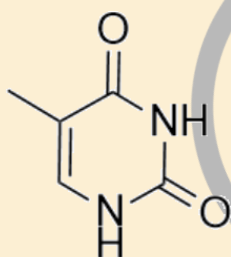


4. In which form uracil is present in DNA?

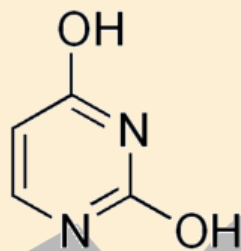
a)



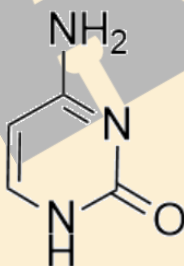
b)



c)



d)



Ans: (a)



Solution

Fact based.

5. Which of the following shows Tyndall effect?

- a) True solution
- b) Lyophobic solution
- c) Lyophilic solution
- d) Suspension

Ans: (b)

Solution

Property	Lyophilic colloids	Lyophobic colloids
Tyndall effect	They do not show Tyndall effect	They show Tyndall effect

Hence, option (b) is the correct answer.

6. When the intensity of radiation incident on photographic plate is increased keeping frequency constant, then the number and K.E of photoelectrons emitted?

- a) Remains same & increases
- b) Increases and remains same
- c) Decreases and remains same
- d) Decreases and decreases

Ans: (b)

Solution

As the intensity increases the number of photons striking on the surface increases hence the number of photo electrons emitted increases whereas the energy of incident photons remains same and hence the kinetic energy of emitted photo electrons remains same Hence, option (b) is the correct answer.

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Hence, 2 is the correct answer.

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11. Which of the following is correct with respect to 'H' and 'D'?

- a) D produces β^+
- b) D is more reactive than H
- c) H is more reactive than D
- d) Equal reactivity

Ans: (c)

Solution:

Reactivity of Deuterium is less than hydrogen due to high bond dissociation energy of D_2

Hence, option (c) is the correct answer.

12. Nature of oxides of V_2O_3 and CrO ?

- a) Amphoteric and Basic
- b) Basic and Basic
- c) Basic and Amphoteric
- d) Acidic and Acidic

Ans: b

Solution

In case of transition metal oxides, the oxides with metals in lower oxidation states are basic in nature. Since, in V_2O_3 and CrO , oxidation states of V and Cr are in lower oxidation states i.e., +3 and +2 respectively. Hence both are basic oxides.

In intermediate oxidation states, they are amphoteric in nature. For example, V_2O_4 , CrO_2 , MnO_2 etc. In higher oxidation states, they are acidic in nature. for example, V_2O_5 , CrO_3 , Mn_2O_7 etc.

13. Find the oxidation number of 'S' in $H_2S_{(x+2)}O_6$

- a) 0 and +5 only
- b) +5 only
- c) 0 and +3 only
- d) +3 only

Ans: (a)

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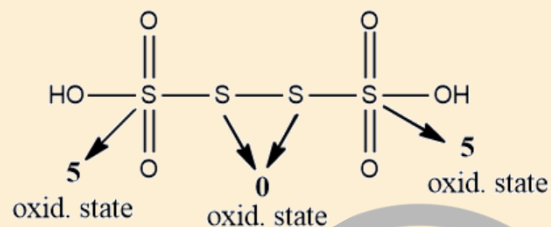


Solution

When $x=2$,

Compound is $\text{H}_2\text{S}_4\text{O}_6$:

Structure:



So, the oxidation states can be 0 and +5.

Hence, option (c) is the correct answer.

14. Match the following:

S. no	Compounds		Number of lone pairs on central atom
1	XeF_2	(i)	0
2	XeF_2O_2	(ii)	1
3	XeF_2O_3	(iii)	2
4	XeF_4	(iv)	3

a) 1-(i), 2-(iv), 3-(ii), 4-(iii)

c) 1-(iv), 2-(ii), 3-(iii), 4-(i)

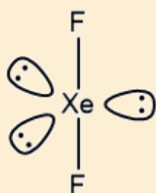
b) 1-(iv), 2-(ii), 3-(i), 4-(iii)

d) 1-(iv), 2-(iii), 3-(i), 4-(ii)

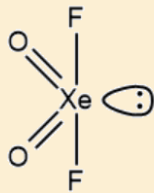
Ans: (b)



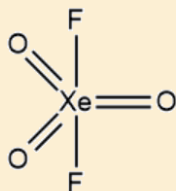
Solution



XeF₂
3 lone pairs



XeO₂F₂
1 lone pair



XeO₃F₂
0 lone pair



XeF₄
2 lone pairs

Hence, option (b) is the correct answer.

15. Find the incorrect statement regarding primary aliphatic amines:

- a) They can be produced by Gabriel phthalimide process
- b) Its solubility is greater than 2° amines
- c) Can be distinguished by carbylamine test
- d) It is less basic than aromatic amines

Ans: (d)

Solution

Gabriel Phthalimide Synthesis is used to get primary amines from primary alkyl halides. Since primary amines have higher number of hydrogens than secondary amines, they show more H-bonding and hence are more soluble than secondary amines.

Primary amines can be distinguished from secondary and tertiary amines by reacting with. Primary amine reacts with CHCl_3 and alc. KOH to form isocyanide while secondary and tertiary amines do not react.

In aromatic amines, lone pair on nitrogen is involved in resonance and hence less available for donation. So, aromatic amines are less basic than primary amines.

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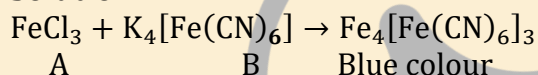
Hence, option (d) is the correct answer.

16. A reacts with B to form Prussian blue compound $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$. A and B are respectively:

- | | |
|--|---|
| a) FeCl_3 and $\text{K}_3[\text{Fe}(\text{CN})_6]$ | b) FeCl_3 and $\text{K}_4[\text{Fe}(\text{CN})_6]$ |
| c) $\text{K}_3[\text{Fe}(\text{CN})_6]$ and $\text{K}_4[\text{Fe}(\text{CN})_6]$ | d) FeCl_3 and KCNS |

Ans: (b)

Solution:



Hence, option (b) is the correct answer.

17. Find the order of Lewis acid strength of BI_3 , BCl_3 , BF_3 , BBr_3 .

- | | |
|--|--|
| a) $\text{BF}_3 < \text{BCl}_3 < \text{BBr}_3 < \text{BI}_3$ | b) $\text{BF}_3 < \text{BBr}_3 < \text{BI}_3 < \text{BCl}_3$ |
| c) $\text{BCl}_3 < \text{BF}_3 < \text{BBr}_3 < \text{BI}_3$ | d) $\text{BBr}_3 < \text{BF}_3 < \text{BI}_3 < \text{BCl}_3$ |

Ans: (a)

Solution:

On the basis of back bonding, smaller the halide atom, more effective be the back bonding in BX_3 .

More effective back bonding show less tendency to accept a pair of electrons.

Hence, correct order of Lewis acid for boron halide is $\text{BF}_3 < \text{BCl}_3 < \text{BBr}_3 < \text{BI}_3$.

18. If we have two particles in a system i.e. A & B where particle 'A' has 4 amu mass and 2-unit charge and another particle B has 9 amu mass and 3-unit charge. Find the correct option regarding A and B:

- | | |
|----------------------------------|----------------------------------|
| a) Deviation of A is more than B | b) Deviation of B is more than A |
| c) None of them will deviate | d) Same deviation |

Ans: (a)

Solution:

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Deviation of the particle depends on its mass to charge ratio. In general, higher mass to charge ratio particle will deviate less. Here, mass to charge ratio of A is 2 and mass to charge ratio of B is 3. Hence, A will deviate more than B.

19. The van der Waal equation is given as:

$$\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$$

Then the dimension of 'a' is

- a) $[\text{atm}][\text{m}^6][\text{mol}]^{-2}$ b) $[\text{atm}]^2[\text{m}^2][\text{mol}]^2$
c) $[\text{atm}]^3[\text{m}^3][\text{mol}]^1$ d) $[\text{atm}]^0$

Ans: (a)

Solution

Since, $\left(P + \frac{an^2}{V^2}\right)$ is a summation, the component P and $\frac{an^2}{V^2}$ should have same dimension.

$$\frac{an^2}{V^2} = [\text{atm}]$$

$$\frac{a(\text{mol})^2}{(\text{m}^3)^2} = [\text{atm}]$$

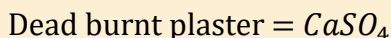
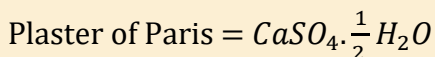
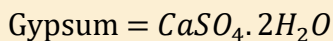
Hence, dimension of 'a' has to be $[\text{atm}][\text{m}^6][\text{mol}]^{-2}$.

20. Find the number of water molecules in gypsum, dead burnt plaster, and plaster of paris.

- a) 3, 0, 1 b) 1, 0, 1
c) 2, 0, 0.5 d) 5, 0, 0.5

Ans: (c)

Solution



Hence, option (c) is correct.



21. **Statement 1:** Ethyl phenyl ether can be prepared by Williamson ether synthesis.
Statement 2: Bromobenzene on reaction with sodium ethoxide gives ethyl phenyl ether.
- a) Statement I is correct and Statement II is correct
b) Statement I is correct and Statement II is incorrect
c) Statement I is incorrect and Statement II is incorrect
d) Statement I is incorrect and Statement II is correct

Ans: (b)

Solution

Due to double bond character in C-Br bond in bromobenzene, reaction with sodium ethoxide is not possible.

Bromobenzene does not undergo nucleophilic aromatic substitution unless they have electron withdrawing group at ortho or para position.

Preparation of Ethyl phenyl ether by Williamson ether synthesis:

