CHEMISTRY

Section-1

1. Match List-I with List-II : List-I - (Drug) List-II - (Class of Drug)

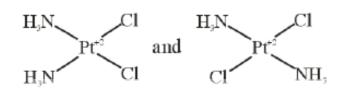
List1	List2	
A. Furacin	I. Antibiotic	
B. Arsphenamine	II. Tranquilizers	
C. Dimetone	III. Antiseptic	
D. Valium	IV. Synthetic antihistamines	
A) A - i, B - iii, C - iv, D - ii	B) A - iii, B - iv, C - ii, D - i	
C) A - ii, B - i, C - iii, D - iv	D) A - iii, B - i, C - iv, D - ii	
Answer: D, Explanation: Furacine acts as Antiseptic Arsphenamine also known as salvarsan acts as antibiotic		
Dimetone is synthetic histamine FECT GUIDE		
Valium is a Tranqulizer		

List1	List2
A. NaOH	I. Acidic
B. BeOH2	II. Basic
C. CaOH2	III. Amphoteric
D. вонз	IV
E. Aloh3	V
A) A - ii, B - ii, C - iii, D - ii, E -	iii B) A - ii, B - iii, C - ii, D - i, E - iii
C) A - ii, B - ii, C - iii, D - i, E - i	ii D) A - ii, B - i, C - ii, D - iii, E - iii
Answer: B, Explanation: NaOH → Basic	
$Be(OH)_2 \rightarrow Amphoteric$	
$Ca(OH)_2 \rightarrow Basic$	
$B(OH)_3 \rightarrow Acidic$	
Al(OH) ₃ → Amphoteric THE P	ERFECT GUIDE

The number of geometrical isomers found in the metal complexes $f[tCl_2(NH_3)_2, Ni(CO)_4,]$ $[Ru(H_2O)_3Cl_3]_{and}[CoCl_2(NH_3)_4]^+$ respectively, are :

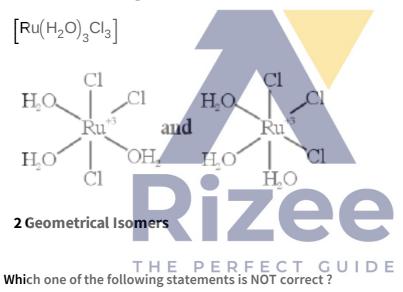
Answer: C, Explanation: $[PtCl_2(NH_3)_2]$

3.



2 Geometrical isomers

 $[Ni(CO)_4] \rightarrow$ All ligands are same Zero Geometrical Isomers



- A) Eutrophication indicates that water body is polluted
- B) The dissolved oxygen concentration below 6 ppm inhibits fish growth
- C) Eutrophication leads to increase in the oxygen level in water
- D) Eutrophication leads to anaerobic conditions

Answer: C, Explanation: Eutrophication leads to decrease in oxygen level of water.

3rd statement is incorrect

4.

Given below are two statements :

Statement I : Rutherford's gold foil experiment cannot explain the line spectrum of hydrogen atom.

Statement II : Bohr's model of hydrogen atom contradicts Heisenberg's uncertainty principle. In the light of the above statements, choose the most appropriate answer from the options given below :

- A) Statement I is false but statement II is true.
- **B)** Statement I is true but statement II is false.
- **C)** Both statement I and statement II are false.
- **D)** Both statement I and statement II are true.

Answer: D,

5.

Explanation:

Rutherford's gold foil experiment only proved that electrons are held towards nucleus by electrostatic forces of attraction and move in circular orbits with very high speeds.

Bohr's model gave exact formula for simultaneous calculation of speed & distance of electron from the nucleus, something which was deemed impossible according to Heisenberg.

6. Presence of which reagent will affect the reversibility of the following reaction, and change it to a irreversible reaction :



It can be irreversible in the presence of strong oxidising agent like conc. HNO₃ or conc. HIO₃

7. Which one among the following chemical tests is used to distinguish mono saccharide from di saccharide ?

A) Seliwanoff's test	B) Iodine test

C) Barfoed test D) Tollen's test

Answer: C, Explanation: Barford test is used for distinguish mono saccharidefrom di saccharide

27-07-2021 JEE MAINS (SHIFT - 1) PAPER - 1 CHEMISTRY MEMORY BASED The statement that is INCORRECT about Ellingham diagram is

- **A)** provides idea about the reaction rate.
- **C)** provides idea about changes in the phases during the reaction.
- **B)** provides idea about free energy change
- **D)** provides idea about reduction of metal oxide.

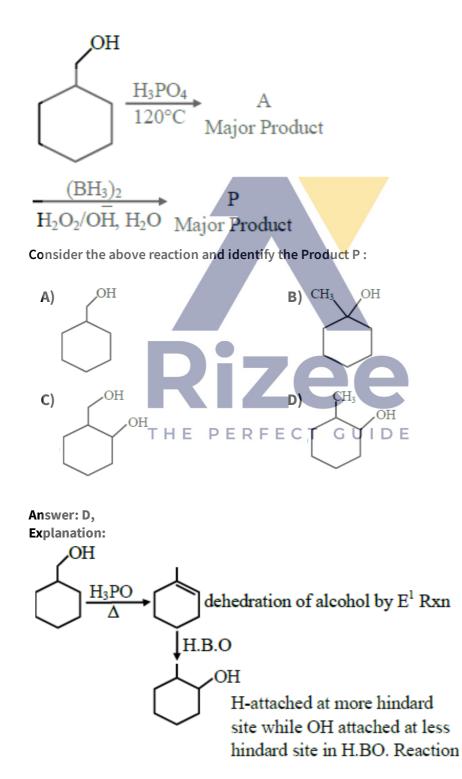
Answer: A,

Explanation:

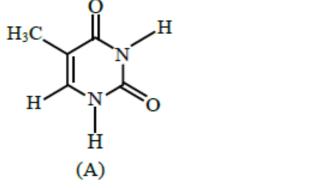
Ellingham diagram is a plot between $\triangle G^{\circ}$ and T and does not give any information regarding rate of reaction



8.







The compound 'A' is a complementary base of ______ in DNA stands.

A) Uracil	B) Guanine
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C) Adenine

D) Cytosine

Answer: C, **Explanation:** Given structure is Thymine and Thymine being paired with adenine

Staggered and eclipsed conformers of ethane are : 11.

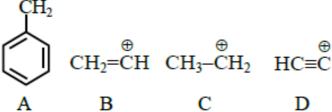
- A) Polymers **B)** Rotamers D) Mirror images
- C) Enantiomers

Answer: B, **Explanation:**

Staggered and eclipsed conformers of ethane also known as rotamers





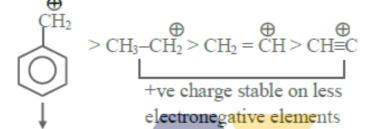


The correct order of stability of given carbocation is :

A) A > C > B > D **B)** D > B > C > A

C) D > B > A > C **D)** C > A > D > B

Answer: A, Explanation:



Stable due to Resonance

13. Given below are two statements : One is labelled as Assertion A and the other labelled as Reason R.

Assertion A : Lithium halides are some what covalent in nature.

Reason R : Lithium possess high polarisation capability.

In the light of the above statements, choose the most appropriate answer from the options given below:

B) A is false but R is true

- A) A is true but R is false
- C) Both A and R are true but R is NOT the C T D) Both A and R are true and R is the correct explanation of A correct explanation of A

Answer: D,

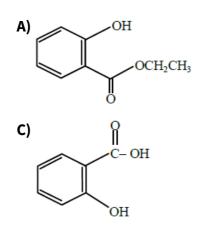
Explanation:

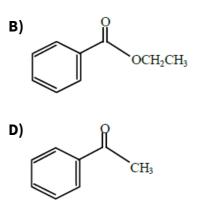
Lithium due to small size has very high polarization capability and thus increases covalent nature in Halides.

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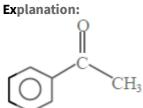
14.

Which one of the following compounds will give orange precipitate when treated with 2,4dinitrophenyl hydrazine ?





Answer: D,



Explanation \Rightarrow 2 - 4 - D.N.P test is used for carbonyl compound (aldehyde & ketone)

15. The product obtained from the electrolytic oxidation of acidified sulphate solutions, is :



Section-2

The parameters of the unit cell of a substance area = 2.5, b = 3.0, c = 4.0, 16. $\alpha = 90^{\circ}$, $\beta = 120^{\circ}$, $\gamma = 90^{\circ}$. The crystal system of the substance is : **B)** Orthorhombic A) Hexagonal C) Monoclinic **D)** Triclinic Answer: C, **Explanation:** $a \neq b \neq c$ and $\alpha = y = 90^{\circ} \neq \beta$ are parameters of monoclinic unit cell. The oxidation states of 'P' in $H_4P_2O_7$, $H_4P_2O_5$ and $H_4P_2O_6$, respectively, are : 17. **A)** 7, 5 and 6 **B)** 5, 4 and 3 **C)** 5, 3 and 4 **D**) 6, 4 and 5 Answer: C, **Explanation:** Oxidation state of P in $H_4P_2O_7$, $H_4P_2O_5$ and $H_4P_2O_6$ is 5, 3 & 4 respectively $H_4P_2O_7$ 2x+4(+1)+7(-1)=0x = +5 $H_4P_2O_5$ 2x+4(+1)+5(-2)=0x = +3THE PERFECT GUIDE $H_4P_2O_6$ 2x+4(+1)+6(-2)=0x = +4

For a reaction of order n, the unit of the rate constant is :

A) $mol^{1-n} L^{1-n} s$ B) $mol^{1-n} L^{2n} s^{-1}$ C) $mol^{1-n} L^{n-1} s^{-1}$ D) $mol^{1-n} L^{1-n} s^{-1}$

Answer: C, Explanation: Rate = $k[A]^n$

comparing units

$$\frac{(\text{mol/I})}{\text{sec}} = k \left(\frac{\text{mol}}{\text{I}}\right)^{n}$$
$$\Rightarrow k = \text{mol}^{1-n} \text{I}^{n-1} \text{s}^{-1}$$

19. Given below are two statements :

Statement I : Aniline is less basic than acetamide.

Statement II : In aniline, the lone pair of electrons on nitrogen atom is delocalised over benzene ring due to resonance and hence less available to a proton.

Choose the most appropriate option ;

- A) Statement I is true but statement II is false.
 - B) Statement I is false but statement II is true.
- C) Both statement I and statement II are true.
 D) Both statement I and statement II are false.

Answer: B,

Explanation:

Explanation :- aniline is more basic than acetamide because in acetamide, lone pair of nitrogen is delocalised to more electronegative element oxygen.

In Aniline lone pair of nitrogen delocalised over benzene ring.

20.

The type of hybridisation and magnetic property of the complex $[MnCl_6]^{3-}$, respectively, are :

A) $sp^{3}d^{2}$ and diamagnetic

B) d^2sp^3 and diamagnetic

C) d^2sp^3 and paramagnetic

D) sp^3d^2 and paramagnetic

Answer: D, Explanation: $[MnCl_6]^{3-}$

$$Mn^{3+} \rightarrow [Ar] \uparrow \uparrow \uparrow \uparrow \uparrow \qquad \underbrace{4s}_{sp^{3}d^{2}} \overset{4p}{\underbrace{4d}}$$

Paramagnetic and having 4 unpaired electrons.

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The density of NaOHsolution is 1.2 g cm^{-3} . The molality of this solution is _____ m. (Round off to the Nearest Integer) [Use : Atomic masses:Na:23.0 u O:16.0 u H:1.0 u Density of H₂O:1.0 g cm⁻³₁

Answer: 5

Answer: _____

Explanation: Consider 1 L solution

21.

Mass of Solution = (1.2×1000) g = 1200 gm

Neglecting volume of NaOH

Mass of water = 1000 gm

Mass of NaOH = (1200 - 1000) gm = 200 gm

 $Moles of NaOH = \frac{200 \text{ g}}{50 \text{ g/mol}} = 5 \text{ mol}$

 $\textbf{Molality} = \frac{5 \text{ mol}}{1 \text{ kg}} = 5 \text{ m}$

22. CO_2 gas adsorbs on charcoal following Freundlich adsorption isotherm. For a given amount of charcoal, the mass of CO_2 adsorbed becomes 64 times when the pressure of CO_2 is doubled. The value of n in the Freundlich isotherm equation is _____×10⁻². (Round off to the NearestInteger)

Answer: 1

Answer: ____

Explanation:

Freundlich isotherm; $\mathbf{m} = \mathbf{k} \cdot \mathbf{p}^n$

Substituting values: $\left(\frac{64}{1}\right) = (2)^{\frac{1}{n}}$

$$\Rightarrow n = \frac{1}{6} = 0.166$$
$$\approx 17 \times 10^{-2}$$

23. The conductivity of a weak acid HA of concentration 0.001 mol L^{-1} is 2.0×10^{-5} S cm⁻¹. If

 $\wedge \mathring{}_{m}^{\circ}(HA) = 190 \text{ S cm}^{2} \text{ mol}^{-1}$, the ionization constant (K_a) of HA is equal to _____× 10⁻⁶. (Round off to the Nearest Integer)

Answer: _____
Explanation:

$$\Lambda_{m} = 1000 \times \frac{K}{M}$$

$$= 1000 \times \frac{2 \times 10^{-5}}{0.001} = 20 \text{ S cm}^{2} \text{ mol}^{-1}$$

$$\Rightarrow \alpha = \frac{\Lambda_{m}}{\Lambda_{m}^{\infty}} = \frac{20}{190} = \left(\frac{2}{19}\right)$$

$$HA \quad \rightleftharpoons \quad H^{+} \quad + \quad A^{-}$$

$$0.001 (1-\alpha) \quad 0.001 \alpha \quad 0.001 \alpha$$

$$\Rightarrow K_{a} = 0.001 \left(\frac{\alpha^{2}}{1-\alpha}\right) = \frac{0.001 \times \left(\frac{2}{19}\right)^{2}}{1-\left(\frac{2}{19}\right)^{2}}$$

$$= 12.3 \times 10^{-6}$$

24. **1.46** g of a bio polymer dissolved in a 100 mL water at 300 K exerted an osmotic pressure of 2.42×10^{-3} bar. The molar mass of the bio polymer is _____ $\times 10^4$ g mol⁻¹ (Round off to the Nearest Integer) [Use: R = 0.083 L bar mol⁻¹ K⁻¹]



 $\pi = Osmotic pressure$

C = Molarity

T = temperature of Solution

let the molar mass be M gm / mol

$$2.42 \times 10^{-3} \text{ bar} = \frac{\left(\frac{1.46 \text{ g}}{\text{Mgm/mol}}\right)}{0.1 \text{ I}} \times \left(\frac{0.083 \text{ I} - \text{bar}}{\text{mol} - \text{K}}\right) \times 300 \text{ K}$$

$$\Rightarrow \text{ M} = 15.02 \times 10^4 \text{ g/mol}$$

An organic compound is subjected to chlorination to get compound A using 5.0 g of chlorine. When 0.5 g of compound A is reacted with AgNO_3 [Carius Method], the percentage of chlorine in compound A is ______ when it forms 0.3849 g of AgCl. (Round off to the Nearest Integer) (Atomic masses of Ag and Cl are 107.87 and 35.5 respectively)

Answer: _____

Explanation:

25.

Answer: 19

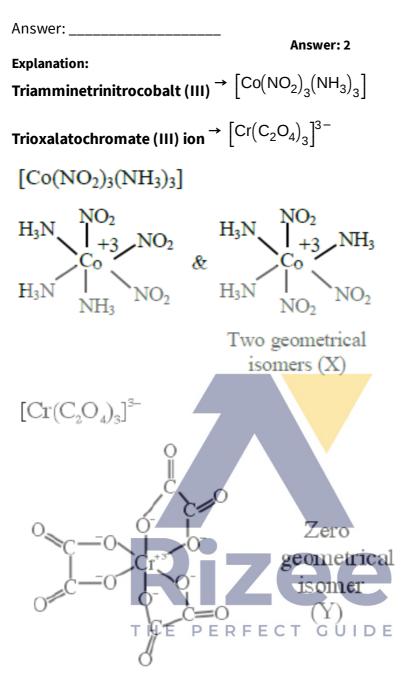
 n_{CI} in compound = $n_{AgCI} = \frac{0.3849 \text{ g}}{(107.87 + 35.5)} \text{ g/mol}$

Mass of chlorine = $n_{Cl} \times 35.5 = 0.0953$ gm

% wt of chlorine = $\frac{0.0953}{0.5} \times 100 = 19.06\%$



The number of geometrical isomers possible in triamminetrinitrocobalt (III) is X and in trioxalatochromate (III) is Y. Then the value of X + Y is _____.



X + Y = 2 + 0 = 2.0

27. In gaseous triethyl amine the "-C-N-C-" bond angle is _____ degree.

Answer: _____

Answer: 108

Explanation: In gaseous triethyl amine the "-C-N-C-" bond angle is 108 degree.

26.

28. For water at 100°C and 1 bar, $\Delta_{vap} H - \Delta_{vap} U = _ \times 10^2 \text{ J mol}^{-1}$ (Round off to the Nearest Integer) [Use: R = 8.31 J mol^{-1} K^{-1}] [Assume volume of $H_2O(I)$ is much smaller than volume of $H_2O(g)$. Assume $H_2O(g)$ treated as an ideal gas] Answer: ______ Answer: 31 Explanation: $H_2O_{(I)} \rightleftharpoons H_2O_{(v)}$ $\Delta H = \Delta U + \Delta n_g RT$ for 1 mole waters $\Delta n_g = 1$ $\therefore \Delta n_g RT = 1 \text{ mol} \times 8.31 \text{ J/mol} - \text{k} \times 373 \text{ K}$ $= 3099.63 \text{ J} \approx 31 \times 10^2 \text{ J}$

29. $PCI_5 \rightleftharpoons PCI_3 + CI_3$, $K_c = 1.844$

3.0 moles of PCl_5 is introduced in a 1 L closed reaction vessel at 380 K. The number of moles of PCl_5 at equilibrium is ______ $\times 10^{-3}$. (Round off to the Nearest Integer) Answer: _____

Answer: 1396 Explanation:

 $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g) K_2 = 1.844$

t=0 3 moles

$$t = \infty \qquad x$$

$$\Rightarrow \frac{[PCl_3][Cl_2]}{[PCl_5]} = \frac{x^2}{3-x} = 1.844$$

$$\Rightarrow x^2 + 1.844 - 5.532 \equiv 0 \text{ perfect GUIDE}$$

$$\Rightarrow x = \frac{-1.844 + \sqrt{(1.844)^2 + 4 \times 5.532}}{2}$$

$$\approx 1.604$$

Moles of $PCl_5 = 3 - 1.604 \simeq 1.396$

The difference between bond orders of CO and NO^{\oplus} is $\frac{x}{2}$ where x =_____ (Round off to the Nearest Integer)

Answer: .0

Answer: _____

Explanation: Bond order of CO = 3

Bond order of $NO^+ = 3$

Difference
$$= 0 = \frac{x}{2}$$

x = 0

