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One has studied the reaction of BMe_3 with the following set of amines and determined the ΔH values for each of the reactions :



(C) \bigcirc d - d transition and d - d transition, respectively

(D) 🔘 Ligand-to-metal charge-transfer and ligand-to-metal charge transfer transition, respectively

(E) O Metal-to-ligand charge-transfer and ligand-to-metal charge-transfer, transition, respectively



Question No.9 (Question Id - 18)

Identify the major product :



Question No.10 (Question Id - 29)

Identify the major product :





Identify the marked hydrogen atoms as heterotopic or homotopic in the following molecules. What will be the correct answer for the given pair of hydrogens :

H1 & H2; H3 & H4; H5 & H6 ?

(A) O All are hototopic

(B) O Homotopic; Heterotopic; Heterotopic

(C) 🔘 Heterotopic; Homotopic; Heterotopic



Question No.17 (Question Id - 32)

Arrange these compounds in descending order of their λ_{max} .



Choose the correct answer from the options given below :

 $\begin{array}{ll} (A) \bigcirc C > D > B > A \\ (B) \bigcirc B > D > A > C \mbox{ (Correct Answer)} \\ (C) \bigcirc A > B > C > D \\ (D) \bigcirc A > C > B > D \\ (E) \bigcirc B > D > C > A \end{array}$

Question No.18 (Question Id - 2)

Find the angle between the two vectors, $\vec{A} = 3\hat{i} - 2\hat{j} + \sqrt{3}\hat{k}$ and $\vec{B} = 5\hat{i} + 3\hat{j} + \sqrt{2}\hat{k}$.

Question No.19 (Question Id - 41)

Some physical properties of chemical compounds are mentioned as follows :

 A. Thermally most stable
 B. Highest proton affinity
 C. Highest solubility in water

 (a) PH_4C1 (a) Me_3N (a) AgF

 (b) PH_4Br (b) Ph_9N (b) AgBr

 (c) PH_4I (c) $N + OOMe_3$ (c) AgI

Which of the following answer set is correct corresponding to the properties mentioned above ?

Question No.20 (Question Id - 50) One can describe the oxygen binding motif in oxyhemerythrin as :

- (A) \bigcirc η^1 superoxide
- (B) \bigcirc η^1 Hydroperoxide (Correct Answer)
- (C) $\bigcirc \ \mu$ η^2 : η^2 peroxide
- (D) $\bigcirc \ \eta^2$ superoxide
- (E) $\bigcirc \ \eta^2$ peroxide

Question No.21 (Question Id - 27)

Write down product A in the following rearrangement reaction :





(E) O 4.1 x 10¹⁷

Question No.26 (Question Id - 5)

From the graph below, the correct order of the real gases with increasing value of the Van der waal's constant 'a' is :



(C) \bigcirc A < B < C < D (Correct (D) \bigcirc B < D < C < A (E) \bigcirc C < D < A < B

Question No.27 (Question Id - 21)

Identify the major product :



Question No.28 (Question Id - 47)

A researcher has measured the room temperature magnetic moments of $Na_2[PdCl_4]$ and $[Fe(H_2O)_6](ClO_4)_2$. In your opinion, which of the following set of answers fits well with your expectation ?

(A) $\bigcirc~$ 0 and 5.1 $\mu_B,$ respectively (Correct Answer)

(B) $\bigcirc~$ 2.9 μ_B and 0, respectively

(C) \bigcirc 0 and 4.7µ_B, respectively

- (D) $\bigcirc~2.83\mu_B$ and $4.90\mu_B,$ respectively
- (E) \bigcirc 0 and 0, respectively

Question No.29 (Question Id - 23)

Draw the major product :





(A) 🔿







Question No.35 (Question Id - 28)

The product A of the following reaction is :

H $> O \xrightarrow{ZnBr_2} A$

(A) 🔿



Question No.39 (Question Id - 11)

For an ideal mixture composed of two components, which of the following is correct ? [x is the mole fraction of one of the components in the mixture]





A. Highest solubility in water between the following compounds :
 (a) CsF, (b) NaF

- B. Highest melting point between the following compounds : (a) AlBr₃, (b) MgBr₂ C. CsF and NaCl has
 - (a) 8 : 8 and 6 : 6 coordination geometry, respectively.
 (b) 6 : 6 and 6 : 6 coordination geometry, respectively.

Choose the correct answer from the options given below :

(A) O A(a), B(b), C(a) (Correct Answer) (B) 🔘 A(b), B(a), C(b) (C) O A(b), B(a), C(a) (D) 🔿 A(a), B(b), C(b) (E) 🔿 A(b), B(b), C(a)

Question No.44 (Question Id - 15)

Following molecules show intense $\pi \rightarrow \pi^*$ electronic transitions in UV-region. Which order of the transition wavelengths is correct for the molecules ?



Question No.45 (Question Id - 43)

Alkene hydrogenation reactions of the following substrates were studied in the presence of Wilkinson's catalyst. Different rate constants were observed for the different substrates. In your opinion, which of the following order of rate constants are correct for the mentioned reaction ?



(B) ○ (C₂H₅)₂Pb (C) \bigcirc Pb₂(C₂H₅)₂ (D) (C₂H₅)₆Pb (E) ○ (C₂H₅)₃PbCl

Question No.47 (Question Id - 9) The below question has been dropped and full marks are awarded.

A container containing 1.0 mole of an ideal monoatomic gas at 127°C is expanded reversibly and isothermally from an initial pressure of 3.0 atm to a final pressure of 1.0 atm. The values of ω , ΔH and ΔS_{sys} for this process are : $[R = 8.3 \text{ Jmol}^{-1}\text{K}^{-1}]$



(E) 🔿 A(c), B(b), C(b)

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