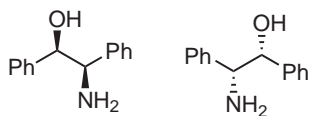


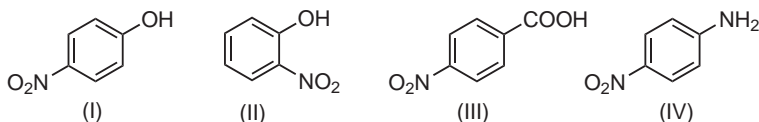
16. The correct stability order of  $-\text{C}\equiv\text{N}$ ,  $-\text{C}\equiv\text{P}$ ,  $-\text{C}\equiv\text{As}$ , and  $-\text{C}\equiv\text{Sb}$  bonds would be
- $-\text{C}\equiv\text{N} > -\text{C}\equiv\text{As} > -\text{C}\equiv\text{Sb} > -\text{C}\equiv\text{P}$ .
  - $-\text{C}\equiv\text{As} > -\text{C}\equiv\text{N} > -\text{C}\equiv\text{P} > -\text{C}\equiv\text{Sb}$ .
  - $-\text{C}\equiv\text{N} > -\text{C}\equiv\text{P} > -\text{C}\equiv\text{As} > -\text{C}\equiv\text{Sb}$ .
  - $-\text{C}\equiv\text{Sb} > -\text{C}\equiv\text{As} > -\text{C}\equiv\text{P} > -\text{C}\equiv\text{N}$ .
17. As predicted by VSEPR theory, the molecular shapes of  $\text{XeF}_2$  and  $\text{XeF}_4$  are respectively
- Bent and square planar.
  - Linear and tetrahedral.
  - Bent and tetrahedral.
  - Linear and square planar.
18. Which of the following statements holds true for Cu(I) and Cu(II) complexes?
- Cu(II) complexes are diamagnetic but Cu(I) complexes are paramagnetic.
  - Both Cu(I) and Cu(II) complexes are paramagnetic.
  - Both Cu(I) and Cu(II) complexes are diamagnetic.
  - Cu(II) complexes are paramagnetic but Cu(I) complexes are diamagnetic.
19. What is the relationship between the two molecules shown below?



- Enantiomers.
  - Diastereomers.
  - Geometrical isomers.
  - Both are identical molecules.
20. Which of the following are aromatic?

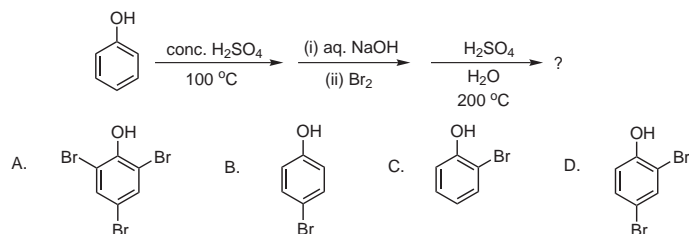


- I, II, and IV.
  - I, III, and V.
  - I, III, and IV.
  - I, IV, and V.
21. Arrange the following molecules in increasing order of acidity.

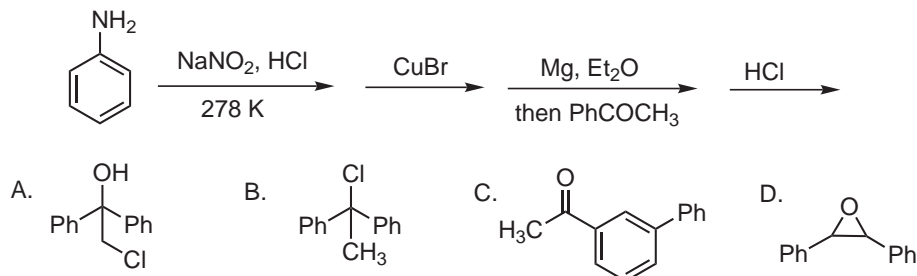


- $\text{IV} < \text{II} < \text{I} < \text{III}$ .
- $\text{IV} < \text{I} < \text{II} < \text{III}$ .
- $\text{III} < \text{IV} < \text{I} < \text{II}$ .
- $\text{I} < \text{II} < \text{IV} < \text{III}$ .

22. What will be the final outcome of the following sequence of reactions?



23. Predict the final product in the following sequence of reactions?



24. For the  $\text{He}^+$  ion which of the following options is true?

- Energy of 3s is less than 3p.
- Energy of 3p is less than 3d.
- Energies of 3s, 3p, and 3d are all the same.
- Energy of 3s is same as 3p, but lower than 3d.

25. For a free expansion of an ideal gas in an isolated chamber, which of the following statements is true?

- Entropy of the system increases.
- Temperature of the system decreases.
- Internal energy of the system decreases.
- Positive work is done by the system.

26. When an aqueous solution was treated with  $\text{AgNO}_3$ , a white precipitate was obtained which was soluble in  $\text{NH}_4\text{OH}$ . The aqueous solution contained

- Sulfate.
- Chloride.
- Acetate.
- Carbonate.

27. A scientist measured the cell length of a cubic crystalline substance to be  $3.0 \times 10^{-8}$  cm. The substance was also found to have a density of 11 g/cc and an atomic mass of 60 u. The number of atoms per unit cell based on the data given above is:

- 4.
- 3.
- 2.
- 1.

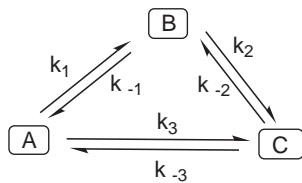
28. The van der Waals coefficient  $a$  (expressed in  $\text{atm} \cdot \text{dm}^6 \cdot \text{mol}^{-2}$ ) for four different gases are: He 0.0341;  $\text{H}_2$  0.242; Kr 5.125;  $\text{O}_2$  1.364. Based on the data given above, the gas that will be expected to have the lowest critical temperature  $T_c$ :

- He.
- $\text{H}_2$ .
- Kr.
- $\text{O}_2$ .

29. 1 mL of  $10^{-5}$  M HCl was diluted to 1 L by adding water. The pH of the resultant solution is

- A. 8.
- B. 6.9.
- C. 5.
- D. 7.1.

30. A, B, and C are in equilibrium as shown in the diagram. Which of the following relations among the rate constants is true?



- A.  $k_1 k_2 k_{-3} = k_3 k_{-1} k_{-2}$ .
- B.  $k_1 k_2 k_3 = k_{-3} k_{-1} k_{-2}$ .
- C.  $k_1 k_{-2} k_3 = k_{-3} k_{-1} k_2$ .
- D.  $k_{-1} k_2 k_3 = k_{-3} k_1 k_{-2}$ .