16. The correct stability order of $-C\equiv N$, $-C\equiv P$, $-C\equiv As$, and $-C\equiv Sb$ bonds would be

    A. $-C\equiv N > -C\equiv As > -C\equiv Sb > -C\equiv P$.
    B. $-C\equiv As > -C\equiv N > -C\equiv P > -C\equiv Sb$.
    C. $-C\equiv N > -C\equiv P > -C\equiv As > -C\equiv Sb$.
    D. $-C\equiv Sb > -C\equiv As > -C\equiv P > -C\equiv N$.

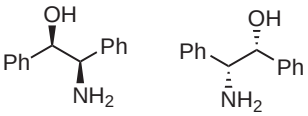
17. As predicted by VSEPR theory, the molecular shapes of XeF_2 and XeF_4 are respectively

    A. Bent and square planar.
    B. Linear and tetrahedral.
    C. Bent and tetrahedral.
    D. Linear and square planar.

18. Which of the following statements holds true for Cu(I) and Cu(II) complexes?

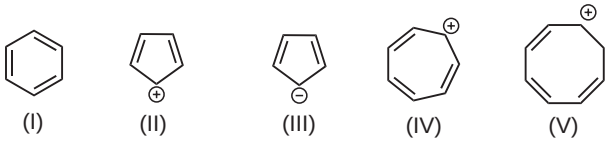
    A. Cu(II) complexes are diamagnetic but Cu(I) complexes are paramagnetic.
    B. Both Cu(I) and Cu(II) complexes are paramagnetic.
    C. Both Cu(I) and Cu(II) complexes are diamagnetic.
    D. Cu(II) complexes are paramagnetic but Cu(I) complexes are diamagnetic.

19. What is the relationship between the two molecules shown below?



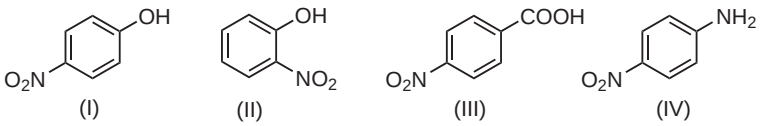
    A. Enantiomers.
    B. Diastereomers.
    C. Geometrical isomers.
    D. Both are identical molecules.

20. Which of the following are aromatic?



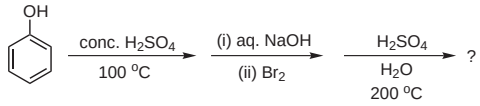
    A. I, II, and IV.
    B. I, III, and V.
    C. I, III, and IV.
    D. I, IV, and V.

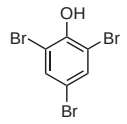
21. Arrange the following molecules in increasing order of acidity.

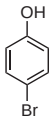


    A. IV < II < I < III.
    B. IV < I < II < III.
    C. III < IV < I < II.
    D. I < II < IV < III.

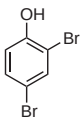
22. What will be the final outcome of the following sequence of reactions?



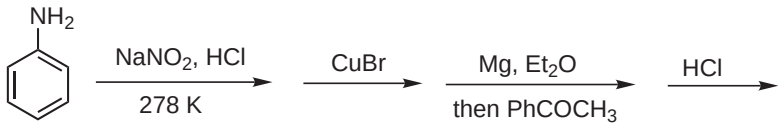
A. 

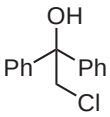
B. 

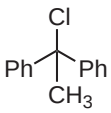
C. 

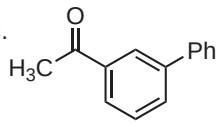
D. 

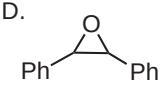
23. Predict the final product in the following sequence of reactions?



A. 

B. 

C. 

D. 

24. For the He^+ ion which of the following options is true?

A. Energy of 3s is less than 3p.

B. Energy of 3p is less than 3d.

C. Energies of 3s, 3p, and 3d are all the same.

D. 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?

A. Entropy of the system increases.

B. Temperature of the system decreases.

C. Internal energy of the system decreases.

D. Positive work is done by the system.

26. When an aqueous solution was treated with $AgNO_3$, a white precipitate was obtained which was soluble in NH_4OH. The aqueous solution contained

A. Sulfate.

B. Chloride.

C. Acetate.

D. Carbonate.

27. A scientist measured the cell length of a cubic crystalline substance to be 3.0×10^{-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:

A. 4.

B. 3.

C. 2.

D. 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; H_2 0.242; Kr 5.125; O_2 1.364. Based on the data given above, the gas that will be expected to have the lowest critical temperature T_c:

A. He.

B. H_2.

C. Kr.

D. 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

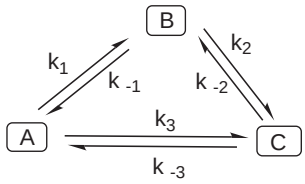
A. 8.

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. $k_{-1} k_2 k_3 = k_{-3} k_1 k_{-2}$.