# CHEMISTRY

1. If the rate of diffusion of O_2 through an orifice is r_1, then the rate of diffusion of the same volume of H_2 through the same orifice under identical conditions will be
   A. r_1
   B. $2r_1$
   C. $4r_1$
   D. $8r_1$

2. Which of the following having the molecular formula C_6H_6 contain(s) a single set of structurally equivalent hydrogen atoms?

   I   II   III   IV
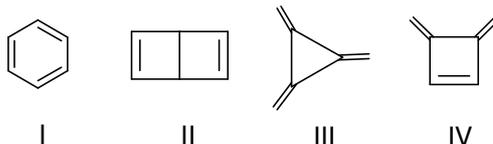
   A. Only I is correct
   B. I, II, and III are correct
   C. Both III and IV are correct
   D. Both I and III are correct

3. For equimolar quantities of the following compounds the maximum depression in freezing point of water will be observed in
   A. Potassium ferrocyanide
   B. Potassium ferricyanide
   C. Potassium chloride
   D. Glucose

4. Which of the following ion is expected to be colorless
   A. Cu^{2+}
   B. Ti^{4+}
   C. V^{3+}
   D. Fe^{2+}

5. Which among the following chemical species has the highest E-E bond energy?

   A. $-C-C-$ B. $-Si-Si-$ C. $N-N$ D. $-O-O-$
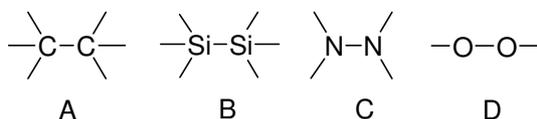
6. For an elementary reaction which is the correct statement?
   A. Order > molecularity
   B. Order < molecularity
   C. Order = molecularity
   D. No relation between order and molecularity

7. Which of the following substrates will have the fastest rate of nucleophilic substitution by an iodide ion?

CH_3CH_2Br $CH_3CH_2CH_2Br$ $(CH_3)_2CHCH_2Br$ $(CH_3)_3CCH_2Br$
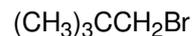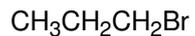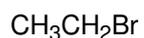
       A   B   C   D

8. The bond order and magnetic behavior of NO^+ is
   - A. Bond order = 2; paramagnetic
   - B. Bond order = 2; diamagnetic
   - C. Bond order = 3; paramagnetic
   - D. Bond order = 3; diamagnetic

9. Arrange the following compounds in decreasing order of their pK_a values
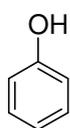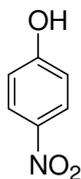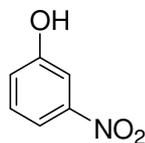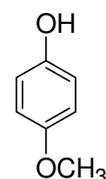
      I   II   III   IV
   - A. I > II > III > IV
   - B. III > II > IV > I
   - C. II > III > I > IV
   - D. IV > III > II > I

10. On oxidation a compound having the molecular formula $C_4H_{10}O$ can be converted into C_4H_8O. The original compound could be:

I.   Primary alcohol, II. Secondary alcohol, III. Tertiary alcohol.
Which of the following options is correct?

   - A. I, II, and III are correct
   - B. Both I and II are correct
   - C. Only I is correct
   - D. Only II is correct