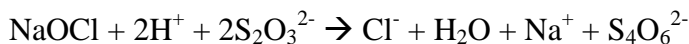


Chemistry 106, Laboratory Test Review Problems

1. Assign oxidation numbers to each element in the following species.



2. The active ingredient in bleach is NaOCl. The amount of NaOCl can be determined by titration with $\text{S}_2\text{O}_3^{2-}$.



9.19 mL of 0.0769 M $\text{S}_2\text{O}_3^{2-}$ is required to titrated 0.505 g of bleach solution. Calculate the percentage of NaOCl in the bleach solution. The molar mass for NaOCl is 74.5 g.

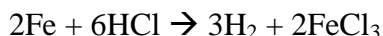
3. A 0.350 g sample of a large biomolecule was dissolved in 15.0 g of chloroform. The freezing point of the solution was -63.74°C . The freezing point of pure chloroform is -63.50°C . K_f for chloroform is $4.70^\circ\text{C}\cdot\text{Kg}/\text{mol}$. Calculate the molar mass of the biomolecule.

$$\Delta T_f = K_f m$$

4. Arrange the following in order of increasing freezing point.



5. For the following reaction, assign oxidation numbers to each element and indicate which element is oxidized and which is reduced.



6. For the following single replacement reaction, complete and the balance the molecular equation. Also, write the complete and net ionic equations.



7. An aqueous solution is saturated with Bi_2S_3 . The concentration of S^{2-} was determined to be 3.0×10^{-15} mole S^{2-}/L . What is K_{sp} for Bi_2S_3 ?
8. K_{sp} for $\text{Cu(IO}_3)_2$ is 1.4×10^{-7} . How many grams of $\text{Cu(IO}_3)_2$ will dissolve in 500 mL of H_2O ? The molar mass of $\text{Cu(IO}_3)_2$ is 413 g.
9. Which is the stronger acid HBrO ($K_a = 2.6 \times 10^{-9}$) or HCN ($K_a = 5.8 \times 10^{-10}$).

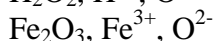
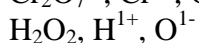
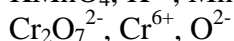
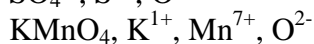
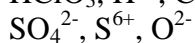
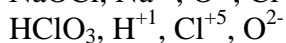
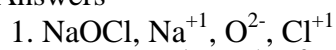
10. Determine whether solutions of the following salts will be acidic, basic, or neutral. For those that produce an acidic or basic solution, write the equation representing the reaction with water.



11. A 0.1 M solution of HBrO has a pH of 4.79. What is Ka?

12. A 0.1 M solution of NaF has a pH of 8.07. What is Kb?

Answers

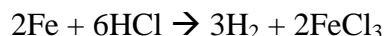


2. 5.21%

3. 4.6 x 10² g/mol

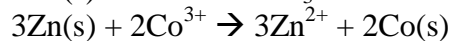
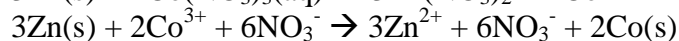
4. AlCl₃ < KBr < C₂H₆O₂

5. 0 +1-1 0 +3 -1



Fe is oxidized, H is reduced.

6. 3Zn(s) + 2Co(NO₃)₃(aq) → 3Zn(NO₃)₂ + 2Co

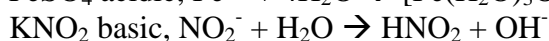
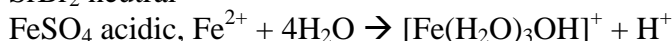


7. K_{sp} = 1.1 x 10⁻⁷³

8. 0.68 g

9. HBrO since it has the large Ka.

10. SrBr₂ neutral



11. 2.63 x 10⁻⁹

12. 1.38 x 10⁻¹¹