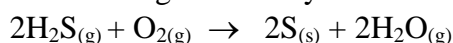


## Chemistry 102 Extra Credit Review

1. At constant temperature, which of the following would be expected to affect the rate of a given chemical reaction?

- I the reaction temperature
  - II the concentration of the products
  - III a catalyst
- a. I only                      b. II only                      c. II and III only                      d. I and III only

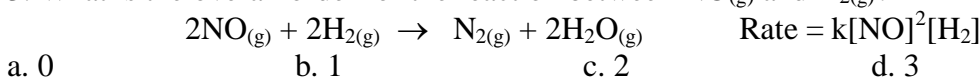
2. From a consideration of the following reaction system:



we can conclude that

- a. the reaction is second order
- b. the reaction is first order
- c. rate =  $k[\text{H}_2\text{S}][\text{O}_2]$
- d. none of the above

3. What is the overall order for the reaction between  $\text{NO}_{(g)}$  and  $\text{H}_2_{(g)}$ ?



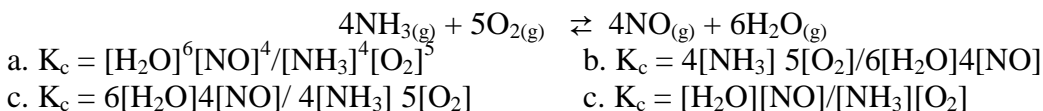
4. At a given temperature, a first-order reaction has a rate constant of  $2.5 \times 10^{-3} \text{ s}^{-1}$ . The time required for the reaction to be 75% completed is approximately:

- a. 120 s                      b. 240 s                      c. 440 s                      d. 550 s

5. Which of the following can we predict from the equilibrium constant for a reaction?

- I the extent of the reaction
  - II whether the reaction is fast or slow
  - III whether a system is at equilibrium by measuring the [reactants] and [products]
- a. I only                      b. II only                      c. II and III only                      d. I and III only

6. Which expression correctly describes the equilibrium constant for the following reaction?



7. Consider the equilibrium  $\text{N}_{2(g)} + 3\text{H}_{2(g)} \rightleftharpoons 2\text{NH}_{3(g)}$  at a certain temperature. An equilibrium mixture in a 8 L vessel contains 1.60 mol  $\text{NH}_3$ , 0.800 mol  $\text{N}_2$ , and 1.20 mol  $\text{H}_2$ . What is the value of  $K_c$ ?

- a. 1.85                      b. 119                      c. 29.6                      d. 75.8

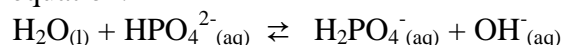
8. The major species besides water in an aqueous solution of hydrochloric acid is:

- a. HCl                      b.  $\text{H}^+$  and HCl                      c.  $\text{H}^+$  and  $\text{Cl}^-$                       d. HCl and  $\text{Cl}^-$

9. All of the following are electrolytes in aqueous media except:

- a.  $\text{HC}_2\text{H}_3\text{O}_2$                       b.  $\text{NaC}_2\text{H}_3\text{O}_2$                       c.  $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$                       d. NaOH

10. Given the net ionic equation:



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- a.  $\text{H}_2\text{O}$  is an acid and  $\text{OH}^-$  is its conjugate base.  
b.  $\text{H}_2\text{O}$  is a base and  $\text{OH}^-$  is its conjugate acid.  
c.  $\text{HPO}_4^{2-}$  is a Bronsted acid because it is a proton acceptor.  
d.  $\text{H}_2\text{O}$  is a Lewis base because it is an electron pair donor.
11. Milk of magnesia has a pH of 10.40. What is its  $[\text{OH}^-]$ ?  
a.  $1.0 \times 10^{-7} \text{ M}$       b.  $2.5 \times 10^{-4} \text{ M}$       c.  $4.0 \times 10^{-11} \text{ M}$       d. 3.6 M
12. A 0.10 M solution of a weak monoprotic acid has a pH of 3.30. What is the equilibrium constant,  $K_a$ , for this acid?  
a.  $5.0 \times 10^{-3}$       b.  $5.0 \times 10^{-4}$       c.  $2.5 \times 10^{-5}$       d.  $2.5 \times 10^{-6}$
13. What is the pH of a solution which is 0.0100 M HA and also 0.0020 M in NaA? ( $K_a = 9.0 \times 10^{-6}$ )  
a. 2.40      b. 4.35      c. 5.65      d. 6.65
14. A weak base is titrated with hydrochloric acid. At the equivalence point:  
a.  $\text{pH} < 7.0$       b.  $\text{pH} = 7.0$       c.  $\text{pH} > 7.0$       d.  $\text{pH} = \text{p}K_a$
15. What is the solubility product expression for  $\text{Fe}(\text{OH})_3$ ?  
a.  $[\text{Fe}^{3+}][3\text{OH}^-]^3$       b.  $[\text{Fe}^{2+}][\text{OH}^-]^2$       c.  $[\text{Fe}^{3+}][\text{OH}^-]^3$       d.  $[\text{Fe}][\text{OH}]$
16. Which of the following would be expected to have the largest entropy value?  
a.  $\text{H}_2\text{O}_{(s)}$       b.  $\text{H}_2\text{O}_{(g)}$       c.  $\text{H}_2\text{O}_{(l)}$       d.  $\text{H}_2\text{O}_{(aq)}$
17. A cell with the potential of 0.74 V has the cell reaction:  
$$2\text{Cr} + 6\text{H}^+ \rightarrow 2\text{Cr}^{3+} + 3\text{H}_2$$
  
If the concentrations of the ions were 1.0 molar and the pressure of  $\text{H}_2$  were 1.0 atmosphere, then  $E^\circ$  for the half-reaction of  $\text{Cr}^{3+} + 3\text{e}^- \rightarrow \text{Cr}$  would be:  
a.  $-0.74 \text{ V}$       b.  $-0.37 \text{ V}$       c.  $0.25 \text{ V}$       d.  $0.37 \text{ V}$
18. A ligand is a:  
a. an ion      b. chelate      c. Lewis base      d. Lewis acid
19. What is the hybridization of an octahedral complex?  
a.  $\text{sp}^2$       b.  $\text{sp}^3$       c.  $\text{sp}^3\text{d}$       d.  $\text{sp}^3\text{d}^2$
20. How many unpaired electrons are there in a strong field Co(III) octahedral complex?  
a. 0      b. 1      c. 2      d. 3