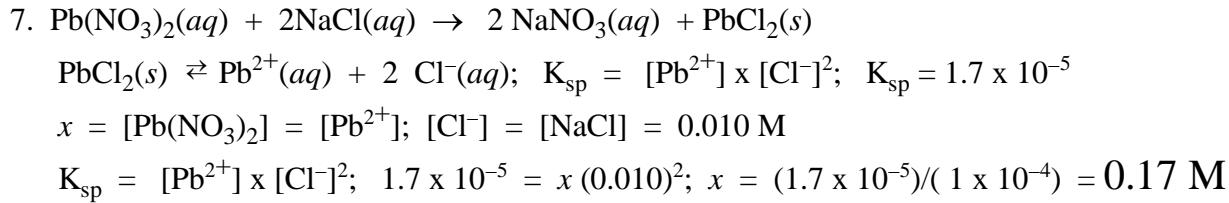
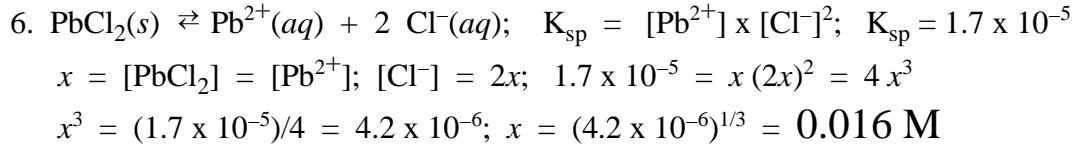
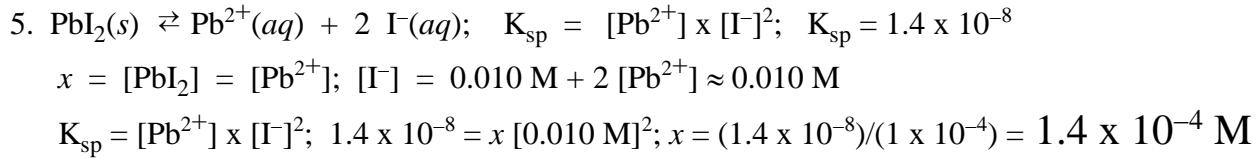
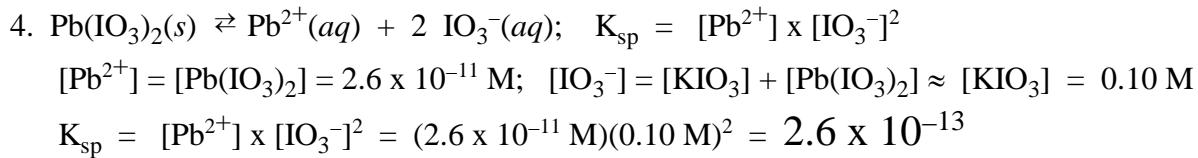
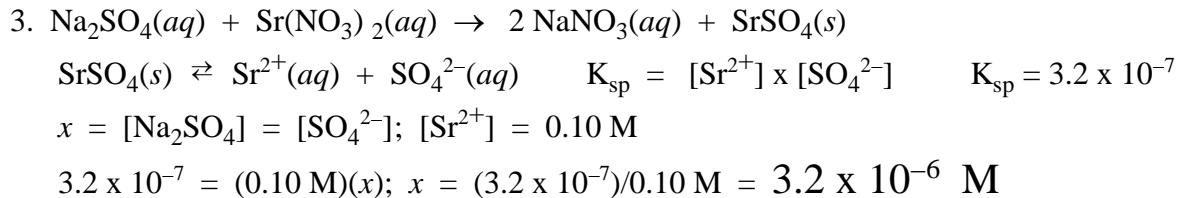


**Answers to More Chapters 15 & 16 Study Questions**

$$1. \frac{K_a}{[H^+]} = \frac{[C_3H_5O_2^-]}{[HC_3H_5O_2]} = \frac{1.3 \times 10^{-5}}{1.0 \times 10^{-5}} = 1.3$$

$$2. \quad pH = pK_a + \log \frac{[H_2BO_3^-]}{[H_3BO_3]}; \quad pK_a = -\log(5.8 \times 10^{-10}) = 9.24; \quad pH = 9.24 + \log \frac{1.5}{1} \\ = 9.24 + 0.18 = 9.42$$



8. a) 0.10 M NaOH; pH = 13 → yellow  
 b) 0.10 M NaOH; pH = 13 → purple  
 c) cresol red is orange when pH = pK<sub>a</sub>; pH = 1  
 d) yellow in methyl yellow: pH > 4; yellow in cresol purple: pH < 7; so, 4 < pH < 7

9. a) moles base = moles acid =  $28.0 \text{ mL} \times \frac{0.150 \text{ moles HCl}}{1000 \text{ mL}} = 0.00420 \text{ moles}$

b) molar mass =  $\frac{\text{mass}}{\text{moles}} = \frac{0.290 \text{ g}}{0.00420 \text{ moles}} = 69.0 \text{ g/mole}$

10. a) moles base = moles acid:  $V_B \times M_B = V_A \times M_A$

$$2.50 \text{ mL} \times 3.00 \text{ M} = 750 \text{ mL} \times M_A; M_A = \frac{2.50 \times 3.00}{750} = 0.0100 \text{ M HCl}$$

b)  $\text{pH} = -\log[\text{H}^+] = -\log(1.00 \times 10^{-2} \text{ M}); \text{pH} = 2.0$