550. If 20.00 mL of a 0.0090 M solution of $(NH_4)_2S$ is mixed with 120.00 mL of a 0.0082 M solution of $Al(NO_3)_3$, does a precipitate form? The K_{sp} of Al_2S_3 is 2.00×10^{-7}.

Mixed Review

551. The molar concentration of a saturated calcium chromate, $CaCrO_4$, solution is 0.010 M at 25°C. What is the K_{sp} of calcium chromate?

552. A 10.00 mL sample of a saturated lead selenate solution is found to contain 0.00136 g of dissolved $PbSeO_4$ at 25°C. Determine the K_{sp} of lead selenate.

553. A 22.50 mL sample of a saturated copper(I) thiocyanate, $CuSCN$, solution at 25°C is found to have a 4.0×10^{-6} M concentration.
  a. Determine the K_{sp} of CuSCN.
  b. What mass of CuSCN would be dissolved in 1.0×10^3 L of solution?

554. A saturated solution of silver dichromate, $Ag_2Cr_2O_7$, has a concentration of 3.684×10^{-3} M. Calculate the K_{sp} of silver dichromate.

555. The K_{sp} of barium sulfite, $BaSO_3$, at 25°C is 8.0×10^{-7}.
  a. What is the molar concentration of a saturated solution of $BaSO_3$?
  b. What mass of $BaSO_3$ would dissolve in 500. mL of water?

556. The K_{sp} of lead(II) chloride at 25°C is 1.9×10^{-4}. What is the molar concentration of a saturated solution at 25°C?

557. The K_{sp} of barium carbonate at 25°C is 1.2×10^{-8}.
  a. What is the molar concentration of a saturated solution of $BaCO_3$ at 25°C?
  b. What volume of water would be needed to dissolve 0.10 g of barium carbonate?

558. The K_{sp} of $SrSO_4$ is 3.2×10^{-7} at 25°C.
  a. What is the molar concentration of a saturated $SrSO_4$ solution?
  b. If 20.0 L of a saturated solution of $SrSO_4$ were evaporated to dryness, what mass of $SrSO_4$ would remain?

559. The K_{sp} of strontium sulfite, $SrSO_3$, is 4.0×10^{-8} at 25°C. If 1.0000 g of $SrSO_3$ is stirred in 5.0 L of water until the solution is saturated and then filtered, what mass of $SrSO_3$ would remain?

560. The K_{sp} of manganese(II) arsenate is 1.9×10^{-11} at 25°C. What is the molar concentration of $Mn_3(AsO_4)_2$ in a saturated solution? Note that five ions are produced from the dissociation of $Mn_3(AsO_4)_2$.

561. Suppose that 30.0 mL of a 0.0050 M solution of $Sr(NO_3)_2$ is mixed with 20.0 mL of a 0.010 M solution of K_2SO_4 at 25°C. The K_{sp} of $SrSO_4$ is 3.2×10^{-7}.
  a. What is the ion product of the ions that can potentially form a precipitate?
  b. Does a precipitate form?

562. Lead(II) bromide, $PbBr_2$, is slightly soluble in water. Its K_{sp} is 6.3×10^{-6} at 25°C. Suppose that 120. mL of a 0.0035 M solution of $MgBr_2$ is mixed with 180. mL of a 0.0024 M $Pb(C_2H_3O_2)_2$ solution at 25°C.
  a. What is the ion product of Br^- and Pb^{2+} in the mixed solution?
  b. Does a precipitate form?

563. The K_{sp} of $Mg(OH)_2$ at 25°C is 1.5×10^{-11}.
  a. Write the equilibrium equation for the dissociation of $Mg(OH)_2$.
  b. What volume of water would be required to dissolve 0.10 g of $Mg(OH)_2$?
  c. Considering that magnesium hydroxide is essentially insoluble, why is it possible to titrate a suspension of $Mg(OH)_2$ to an equivalence point with a strong acid such as HCl?

564. Lithium carbonate is somewhat soluble in water; its K_{sp} at 25°C is 2.51×10^{-2}.
  a. What is the molar concentration of a saturated Li_2CO_3 solution?
  b. What mass of Li_2CO_3 would you dissolve in order to make 3440 mL of saturated solution?

565. A 50.00 mL sample of a saturated solution of barium hydroxide, $Ba(OH)_2$, is titrated to the equivalence point by 31.61 mL of a 0.3417 M solution of HCl. Determine the K_{sp} of $Ba(OH)_2$.

566. Calculate the K_{sp} for salts represented by QR that dissociate into two ions, Q^+ and R^-, in each of the following solutions:
  a. saturated solution of QR is 1.0 M
  b. saturated solution of QR is 0.50 M
  c. saturated solution of QR is 0.1 M
  d. saturated solution of QR is 0.001 M

567. Suppose that salts QR, X_2Y, KL_2, A_3Z, and D_2E_3 form saturated solutions that are 0.02 M in concentration. Calculate K_{sp} for each of these salts.

568. The K_{sp} at 25°C of silver bromide is 5.0×10^{-13}. What is the molar concentration of a saturated AgBr solution? What mass of silver bromide would dissolve in 10.0 L of saturated solution at 25°C?

569. The K_{sp} at 25°C for calcium hydroxide is 5.5×10^{-6}.
  a. Calculate the molarity of a saturated $Ca(OH)_2$ solution.
  b. What is the OH^- concentration of this solution?
  c. What is the pH of the saturated solution?

570. The K_{sp} of magnesium carbonate is 3.5×10^{-8} at 25°C. What mass of $MgCO_3$ would dissolve in 4.00 L of water at 25°C?

Redox Equations: Chap. 19, Sec. 2

Reactions in Acidic Solution

Balance the following redox equations. Assume that all reactions take place in an acid environment where H^+ and H_2O are readily available.

571. $Fe + SnCl_4 \rightarrow FeCl_3 + SnCl_2$

572. $H_2O_2 + FeSO_4 + H_2SO_4 \rightarrow Fe_2(SO_4)_3 + H_2O$

573. $CuS + HNO_3 \rightarrow Cu(NO_3)_2 + NO + S + H_2O$

574. $K_2Cr_2O_7 + HI \rightarrow CrI_3 + KI + I_2 + H_2O$