63. A mixture of gases contains 0.31 mole CH₄, 0.25 mole C₂H₆, and 0.29 mole C₃H₈. The total pressure is 1.50 atm. Calculate the partial pressures of the gases.

64. A 2.5-L flask at 15°C contains a mixture of N₂, He, and Ne at partial pressures of 0.32 atm for N₂, 0.15 atm for He, and 0.42 atm for Ne.
   (a) Calculate the total pressure of the mixture.
   (b) Calculate the volume in liters at STP occupied by He and Ne if the N₂ is removed selectively.

68. A sample of zinc metal reacts completely with excess hydrochloric acid:

   Zn (s) + 2 HCl (aq) → ZnCl₂ (aq) + H₂ (g)

The hydrogen gas produced is collected over water at 25.0°C using an arrangement similar to that shown in Figure 5.15. The volume of the gas is 7.80 L, and the pressure is 0.980 atm. Calculate the mass of zinc consumed in the reaction (P_vap of H₂O at 25.0°C is 23.8 mmHg).
70. A sample of NH₃ gas is completely decomposed to N₂ and H₂ gases over heated iron wool. If the total pressure is 866 mmHg, calculate the partial pressures of N₂ and H₂.

102. Consider the following apparatus. Calculate the partial pressures of He and Ne after the stopcock is open. The temperature remains constant at 16°C.