Chemistry 145 – Van Bramer
Fall 2016 Homework – Chapter 5

Textbook Questions:
59, 65, 79, 99

Additional Questions

1. The volume of a bicycle tire is 1.35 liters and the manufacturer recommends a tire pressure of 125 PSI.
    a. If you want the bicycle tire to have the correct pressure at 20.0 °C, what volume of air is required at STP?
    b. If you fill the tire with nitrogen, what is the mass of the gas?
    c. If you fill the tire with compressed gas from a 100.0 mL cylinder at 1.50x107 Pa, what is the final pressure in the tire? Will it explode?
    d. You fill the bicycle tire to 125 PSI on a cold december day (-22 °F), and leave it until a hot day in July (101 °F). What is the pressure of the tire (assuming that it does not leak and it does not change volume or burst).

2. A fire extinguisher with a volume of 3.0 liters is filled with 150.0 grams of CO2.
    a. Assuming that it is an ideal gas, what is the pressure at 20.0 °C?
    b. What is the volume of the CO2 at 1.0 atm and 25 °C after the CO2 is released from the fire extinguisher?

3. A ballon used for sampling stratospheric ozone is filled with 150.0 kg of He. What is the volume of the balloon when,
    a. The balloon starts from a research station in Antartica at sea level where the barrometric pressure is 755 mmHg and the temperature is -25.0 °C.
    b. The balloon rises to 10,000 ft (3048 m, the height of a medium size mountain) where the instruments report that the temperature is -50 °C and the pressure is 6.368x104 Pa.
    c. The balloon continues to rise, at 29,028 ft (8,848 m, the height of Mt Everest and about typical crusing altitude for a jet aircraft) the temperature is -70 °C and the pressure is 2.30x104 Pa.
    d. The balloon enters the stratosphere, at 65000 ft (20,000 m, crusing altutude for a U2 spy plane) the temperature is -70 °C and the pressure is 3.68x103 Pa.
    e. The balloon reaches its maximum altitude of 100000 ft (30500 m) the temperature is -3°C and the pressure is 616 Pa.