**Homework:**

Solve each of the following mole conversion problems. All problems must be set up correctly and you must show all of your work to get credit. Put a box around your final answer and label it with the proper units. Assume all gases are at STP.

1. How many molecules of $H_2S$ are there in 2.0 liters of the substance?

$$2.0 \div 22.4 \times 6.022 \times 10^{23} = \boxed{5.4 \times 10^{22} \; H_2S \; \text{molecules}}$$

2. How many molecules of nitrogen gas ($N_2$) are there in 62.0 liters of the substance?

$$62.0 \div 22.4 \times 6.022 \times 10^{23} = \boxed{1.67 \times 10^{24} \; N_2 \; \text{molecules}}$$

3. What is the mass of 32.0 liters of oxygen gas ($O_2$)?

$$32.0 \div 22.4 \times 32.00 = \boxed{45.7 \, g \; O_2}$$

4. What is the mass of 19.5 liters of carbon dioxide ($CO_2$)?

$$19.5 \div 22.4 \times 44.01 = \boxed{38.3 \, g \; CO_2}$$

5. What is the volume of 450.0 grams of nitrous oxide ($N_2O$)?

$$450.0 \div 44.02 \times 22.4 = \boxed{229 \, L \; N_2O}$$

6. What is the volume of 50.0 grams of fluorine gas ($F_2$)?

$$50.0 \div 38.00 \times 22.4 = \boxed{29.5 \, L \; F_2}$$

7. How many molecules are there in 500.0 grams of water?

$$500.0 \div 18.02 \times 6.022 \times 10^{23} = \boxed{1.671 \times 10^{25} \; H_2O \; \text{molecules}}$$

8. How many formula units are there in 850.0 grams of sodium chloride ($NaCl$)?

$$850.0 \div 58.44 \times 6.022 \times 10^{23} = \boxed{8.759 \times 10^{24} \; \text{formula units} \; NaCl}$$

9. What is the mass of $3.2 \times 10^{25}$ atoms of selenium?

$$3.2 \times 10^{25} \div 6.022 \times 10^{23} \times 78.96 = \boxed{4200 \, g \; Se}$$

10. What is the mass of $2.8 \times 10^{20}$ formula units of sodium bicarbonate ($NaHCO_3$)?

$$2.8 \times 10^{20} \div 6.022 \times 10^{23} \times 84.01 = \boxed{0.039 \; \text{formula units} \; NaHCO_3}$$

11. What is the volume of $7.5 \times 10^{24}$ molecules of sulfur dioxide ($SO_2$)?

$$7.5 \times 10^{24} \div 6.022 \times 10^{23} \times 22.4 = \boxed{280 \text{ L } SO_2}$$

12. What is the volume of $6.1 \times 10^{22}$ molecules of carbon monoxide (CO)?

$$6.1 \times 10^{22} \div 6.022 \times 10^{23} \times 22.4 = \boxed{2.3 \text{ L } CO}$$

13. What is the mass of 2.0 liters of dichlorodifluoromethane ($CCl_2F_2$)?

$$2.0 \div 22.4 \times 120.91 = \boxed{11 \text{ g } CCl_2F_2}$$

14. What is the volume of 42.0 grams of freon ($C_2Cl_4F_2$)?

$$42.0 \div 203.82 \times 22.4 = \boxed{4.62 \text{ L } C_2Cl_4F_2}$$

15. How many freon molecules ($C_2Cl_4F_2$) are there in 3.33 liters of the substance?

$$3.33 \div 22.4 \times 6.022 \times 10^{23} = \boxed{8.95 \times 10^{22} \text{ freon molecules}}$$