Homework

8.60×10^{27} ~~molecules CO_2~~ $\times \dfrac{1 \text{ mol } CO_2}{6.02 \times 10^{23} \text{ ~~molecules } CO_2}$

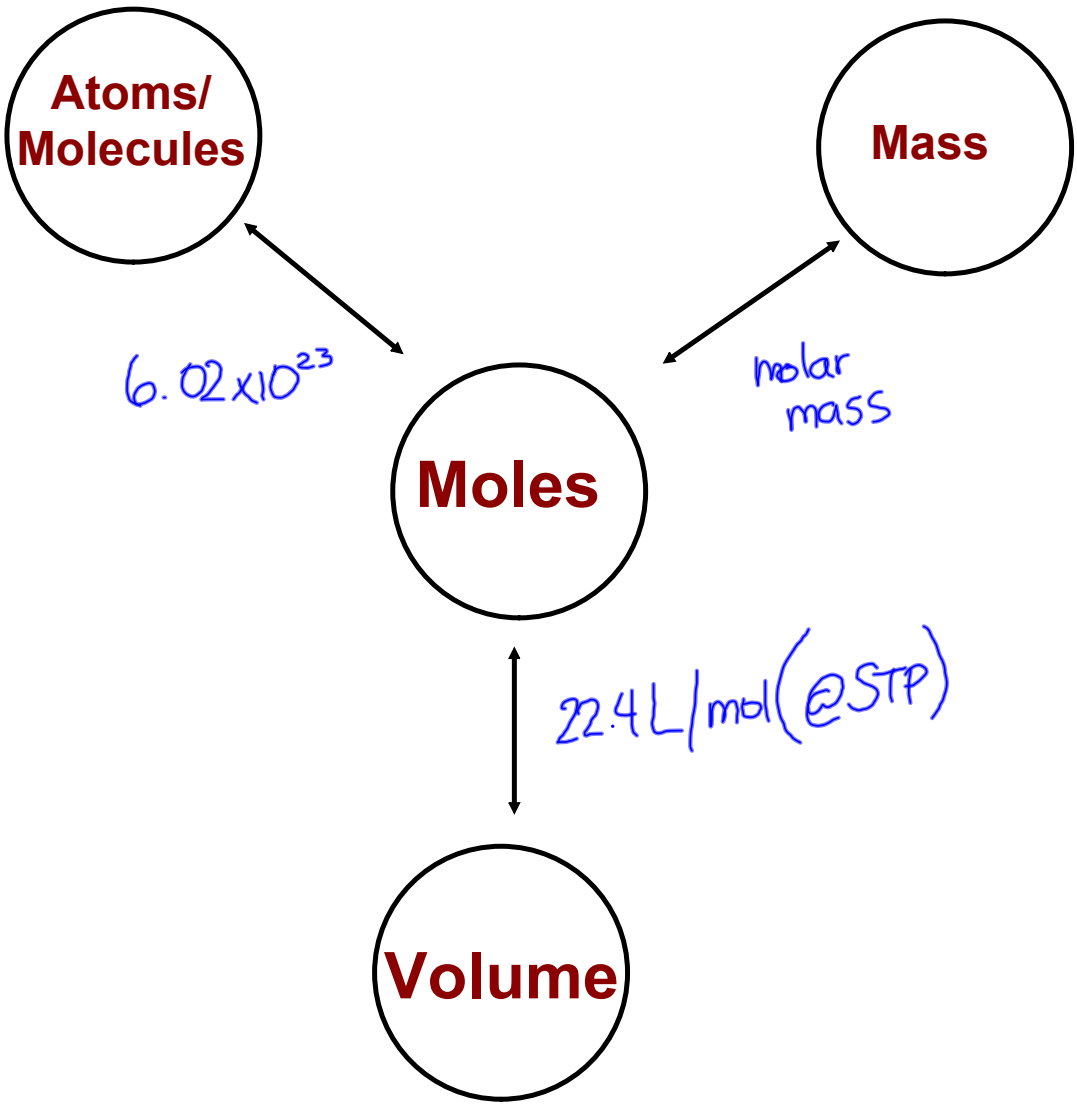
$= \boxed{14\,300 \text{ mol } CO_2}$

(12) 80.0 ~~mol $CaSO_4$~~ $\times \dfrac{136.14 \text{ g } CaSO_4}{1 \text{ ~~mol } CaSO_4} = \boxed{10\,900 \text{ g } CaSO_4}$

$CaSO_4 \rightarrow (1 \times 40.08) + (1 \times 32.06) + (4 \times 16.00) =$

136.14 g/mol

(13) 1000 g ~~Br_2~~ $\times \dfrac{1 \text{ mol } Br_2}{159.80 \text{ g } Br_2} = \boxed{6.26 \text{ mol } Br_2}$


Atoms/
Molecules
Mass
6.02x10^23
molar
mass
Moles
22.4L/mol(@STP)
Volume

1. 8.97×10^{-3} mol
2. 1.49×10^{25} atoms
3. 1.30×10^{26} atoms
4. 46.01 g/mol
5. 14 300 mol
6. 342.34 g/mol
7. 159.70 g/mol
8. 4.24×10^{24} molecules
9. 1.79×10^{25} atoms
10. 643 g
11. 0.266 mol
12. 10 900 g
13. 6.26 mol

Mole-Volume Relationship

Avagadro's Hypothesis
Equal volumes of gases at the same temperature and pressure contain equal number of particles.

Standard temperature and pressure (STP)
0.^{o}C and 101.3kPa

At STP, 1 mol (6.02 x10^{23} representative particles) of any gas contains 22.4 L.

V_m @ STP = 22.4 L/mol

Calculating Volume at STP

L

Ex. Determine the volume of oxygen gas 0.375 mol will occupy at STP.

$$0.375 \text{ mol } O_2 \times \frac{22.4 \text{ L } O_2}{1 \text{ mol } O_2} = 8.40 \text{ L } O_2$$

Calculating Volume at STP

Ex. How many moles of helium are found in 30.3 L at STP conditions?

$$30.3\ \text{L He} \times \frac{1\ \text{mol He}}{22.4\ \text{L He}} = 1.35\ \text{mol He}$$

p. 301 #20, 21

p. 303 #24-28, 31