Warm Up

Na^+ PO_4^{3-}

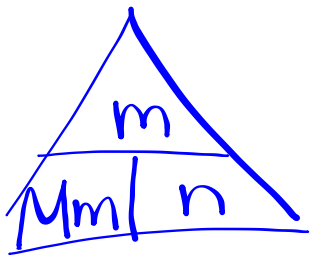
Calculate the mass of 0.905 moles of sodium phosphate.

$$0.905\,mol\ Na_3PO_4 \times \frac{163.94\,g\ Na_3PO_4}{1\ mol\ Na_3PO_4} = \boxed{148\,g\ Na_3PO_4}$$

$Na_3PO_4 \rightarrow (3 \times 22.99) + (1 \times 30.97) + (4 \times 16.00)$

$= 163.94\,g/mol$

$$Mm = \frac{m}{n}$$



$$163.94\,g/mol = \frac{m}{0.905\,mol}$$

$$m = (163.94\,g/mol)(0.905\,mol)$$

$$m = 148\,g$$

Homework

Mole-Volume Relationship

6.02×10^{23}

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

SATP

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

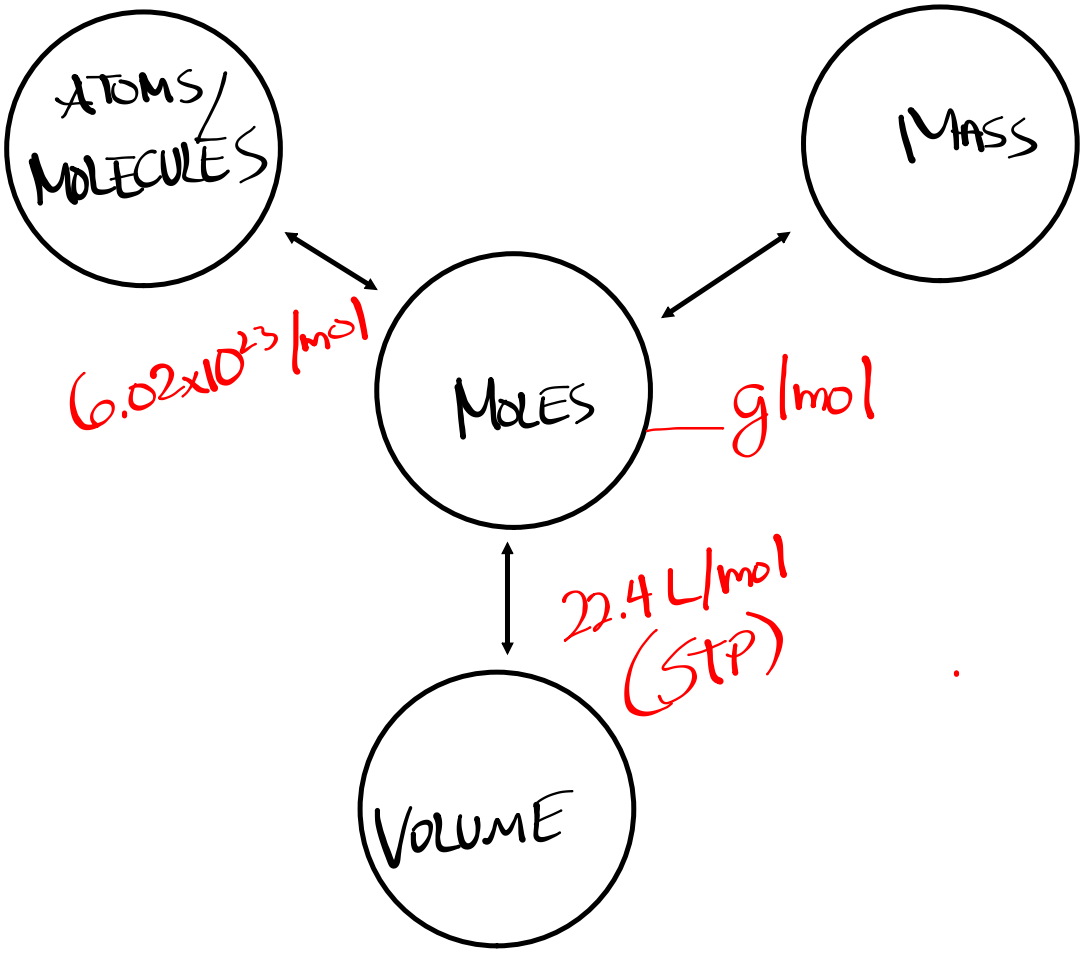
At STP, 1 mol (6.02 x10^{23} representative particles) of any gas contains 22.4 L.

V_m @ STP = 22.4 L/mol

Oxygen → 1 mol = 22.4 L

Helium → 1 mol = 22.4 L

} 0°C 101.3kPa


ATOMS / MOLECULES
MASS
MOLES
VOLUME
6.02x10^23 /mol
g/mol
22.4 L/mol (STP)

Calculating Volume at STP

22.4 L/mol

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

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

Ex. Determine the number of moles of helium gas found in 21.8 L at STP.

$$21.8\ \text{L He} \times \frac{1\ \text{mol He}}{22.4\ \text{L He}} = 0.973\ \text{mol He}$$

Homework

p. 298-301 #16-21

p. 303 #26-28, 31

Complete worksheet

Molar calculations worksheet

1. 8.97 x 10^{3} mol
2. 1.49 x 10^{25} atoms
3. 1.30 x 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 x 10^{24} molecules
9. 1.79 x 10^{25} atoms
10. 643 g
11. 0.266 mol
12. 10 900 g
13. 6.26 mol