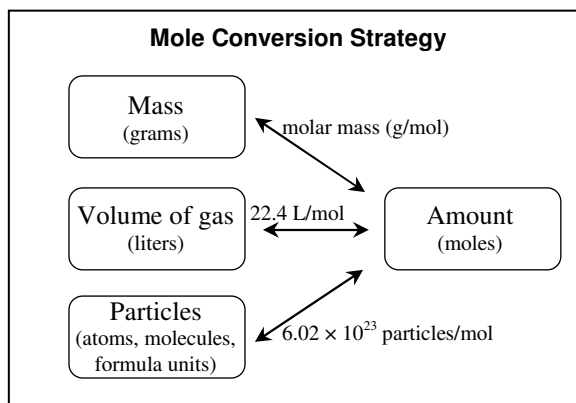


Mole Conversions

Chem Worksheet 11-3

Name _____

It is important to be able to convert units from and into units of moles. The mole is a unit for count, as is the dozen. A dozen is 12 items, but a mole is 602 000 000 000 000 000 000 , or 6.02×10^{23} particles. Using the periodic table we can find the **molar mass**, or the mass of a mole of a substance.



The **molar volume** is the volume of a mole of substance. All gases have the same molar volume when measured at standard temperature and pressure (STP) : 22.4 L/mol. These values allow the conversion of grams, liters, or particles into moles.

example

How many molecules are present in a sample of calcium chloride CaCl_2 with a mass of 1.62 grams?

- develop a strategy:

grams \rightarrow moles \rightarrow molecules

- write 'given' and unknown units:

$$\frac{1.62 \text{ g}}{1} \times \text{---} \times \text{---} = \text{molecules}$$

- fill in conversion factors:

$$\frac{1.62 \text{ g}}{1} \times \frac{1 \text{ mol}}{110.98 \text{ g}} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} = \text{molecules}$$

- solve:

$$\frac{(1.62 \text{ g})(1 \text{ mol})(6.02 \times 10^{23} \text{ molecules})}{(1)(110.98 \text{ g})(1 \text{ mol})} = 8.79 \times 10^{21} \text{ molecules}$$

Answer the following questions.

- A sample of neon has a volume of 75.8 L at STP. How many moles are present?
- What is the mass in grams of a 8.4 mole sample of iron?
- Convert 0.45 g of sodium hydroxide, NaOH to moles.
- How many molecules are present in a sample of carbon dioxide, CO_2 with a mass of 168.2 g?
- How many moles of potassium nitrate, KNO_3 are present in a sample with a mass of 85.2 g.
- What is the mass in grams of 0.94 moles of sodium bicarbonate, NaHCO_3 ?
- Convert 7.8 liters of carbon tetrafluoride CF_4 to grams.
- A gold coin contains 3.47×10^{23} gold atoms. What is the mass of the coin in grams?
- What is the volume in liters of 7500 g of helium atoms. Assume STP conditions.
- A teaspoon of salt, NaCl has a mass of about 5.0 g. How many formula units are in a teaspoon of salt?
- What is the mass of 500 trillion (5.0×10^{14}) molecules of water?
- One component of smog is nitrogen monoxide, NO . A car produces about 8 g of this gas per day. What is the volume at STP?