

CHEM 101 Day 4

Hydrochloric acid reacts with sodium carbonate to produce sodium chloride, water, and carbon dioxide



Formula weight



$$(3 \times 40.08\text{amu}) + (2 \times 30.97\text{amu}) + (8 \times 16.00\text{amu}) = 310.18 \text{ amu}$$

Mole

$$= 6.02 \times 10^{23} = \text{Avagadro's number (the number equal to its formula weight in grams)}$$

$$1 \text{ atom of C} = 12.01 \text{ amu, } 1 \text{ mole of C} = 12.01 \text{ g}$$

$$1 \text{ mole of } \text{Ca}_3(\text{PO}_4)_2 = 310.18 \text{ g}$$

Molar mass

If you have 27.5g of SnF_2 , how many mole is this?

$$\text{MM} = 118.7 \text{ g} + 2(19.0 \text{ g}) = 156.7 \text{ g/mole}$$

$$27.5 \text{ g } \text{SnF}_2 \times (1\text{mole } \text{SnF}_2/156.7 \text{ g } \text{SnF}_2) = 0.175 \text{ mol } \text{SnF}_2$$

3.41 moles of $\text{C}_2\text{H}_5\text{OH}$ is equivalent to how many grams?

$$\text{MM} = 46.0 \text{ g/mole}$$

$$3.41 \text{ moles } \text{C}_2\text{H}_5\text{OH} \times (46.0 \text{ g } \text{C}_2\text{H}_5\text{OH}/1 \text{ mol } \text{C}_2\text{H}_5\text{OH}) = 157 \text{ g } \text{C}_2\text{H}_5\text{OH}$$

How many moles of H atoms and how many moles of O atoms are in 2 moles of water?

$$2 \text{ mol H} = 1 \text{ mol } \text{H}_2\text{O}, 1 \text{ mol O} = 1 \text{ mol } \text{H}_2\text{O}$$

$$2 \text{ mol } \text{H}_2\text{O} \times (2 \text{ mol H}/1 \text{ mol } \text{H}_2\text{O}) = 4 \text{ mol H}$$

$$2 \text{ mol } \text{H}_2\text{O} \times (1 \text{ mol O}/1 \text{ mol } \text{H}_2\text{O}) = 2 \text{ mol O}$$

How many moles of anions are in 35.6 g of aluminum fluoride? Aluminum fluoride = AlF_3

$$\text{MM} = 83.98 \text{ g/mole}$$

$$35.6 \text{ g } \text{AlF}_3 \times (1 \text{ mol } \text{AlF}_3/83.98 \text{ g } \text{AlF}_3) = 0.4239 \text{ mol } \text{AlF}_3$$

$$0.4239 \text{ mol } \text{AlF}_3 \times (3 \text{ mol F}/1 \text{ mol } \text{AlF}_3) = 1.27 \text{ mol F}$$

An aspirin tablet contains 0.36 g of aspirin ($\text{C}_9\text{H}_8\text{O}_4$). How many aspirin molecules is this?

$$\text{MM} = 180 \text{ g}$$

$$0.36 \text{ g } \text{C}_9\text{H}_8\text{O}_4 \times (1 \text{ mol } \text{C}_9\text{H}_8\text{O}_4/180.0 \text{ g } \text{C}_9\text{H}_8\text{O}_4) = 0.0020 \text{ mol}$$

$$0.0020 \text{ mol } \text{C}_9\text{H}_8\text{O}_4 \times (6.02 \times 10^{23} \text{ molecules}/1 \text{ mol } \text{C}_9\text{H}_8\text{O}_4) =$$

What is the molar mass of cholesterol if 0.5731 moles weighs 221.6 g?

$$\text{MM} = \text{g/mol}$$

$$221.6\text{g}/0.5731 \text{ mol} = 386.7 \text{ g/mol}$$

Stoichiometry



If you want to make 4 moles of NH_3 , how many moles of H_2 do you need? $2(3 \text{ mol H}_2) = 6 \text{ mol H}_2$

If you begin with 10.5 mol H_2 , how many moles of NH_3 can be produced?

$$10.5 \text{ mol H}_2 \times (2 \text{ mol NH}_3/3 \text{ mol H}_2) = 7.00 \text{ mol NH}_3$$

How many grams is this?

$$7.00 \text{ mol NH}_3 \times (17.0\text{g NH}_3/1 \text{ mol NH}_3) = 119 \text{ g NH}_3$$