Calculating Molecular Masses

When chemicals are reacted, it is important to know how much of each chemical are in the reactants and how much is produced in the products. This number might be in grams or numbers of atoms or molecules. A convenient measure is called the **mole** which is written as **mol** when used as a unit of chemical quantity. The term **molecular weight** (also called molecular mass, atomic weight) is used to quantify chemicals. Even though it is not a weight (a force in physics), but actually a mass, the term molecular weight is more commonly used. A related term formula weight is a bit different, but we will only be concerned with molecular weight/mass.

Grouping for Eggs	**Dozens and Eggs**	**Grouping for Atoms/Molecules**	**Moles and Atoms/Molecules**
Dozen Size	1 dozen = 12 things	Mole Size	1 mol = 6.02×10^{23} things
Mass per dz of Eggs	Jumbo: = 852 g/dz large: = 684 g/dz small: = 516 g/dz	Mass per mol of Atoms	H: 1.01 g/mol S: 32.06 g/mol O: 16.00 g/mol (from Periodic Table of Elements)
Mass of an Egg	Jumbo: (852 g/dz)/(12 eggs/dz) = 71 g/egg large: (684 g/dz)/(12 eggs/dz) = 57 g/egg small: (516 g/dz)/(12 eggs/dz) = 43 g/egg	Mass of anAtom	H: (1.01 g/mol)/(6.02×10^{23} atoms/mol) = 1.68×10^{-24} g/atom S: (32.06 g/mol)/(6.02×10^{23} atoms/mol) = 5.33×10^{-23} g/atom O: (16.00 g/mol)/(6.02×10^{23} atoms/mol) = 2.66×10^{-23} g/atom
Basket Content	2 small, 1 jumbo, 4 large	Molecule	H_2SO_4
Mass of Basket	2 x 43 g + 1 x 71 g + 4 x 57 g = 385 g	Mass of H_2SO_4 Molecule	2 x 1.68×10^{-24} g + 1 x 5.33×10^{-23} g + 4 x 2.66×10^{-23} g = 16.31×10^{-22} g
Mass per dz Baskets	2 dz x 516 g/dz + 1 dz x 852 g/dz + 4 dz x 684 g/dz = 4620 g	Mass per Mole of H_2SO_4	2 x 1.01 g/mol + 1 x 32.06 g/mol + 4 x 16.00 g/mol = 98.08 g/mol
Mass of 5 dz Baskets	5 dz x 4620 g/dz = 23100 g	Mass of 5 mol of H_2SO_4	5 mol x 98.08 g/mol = 490.4 g
Mass of 5 dz jumbo eggs	5 dz x 852 g/dz = 4260 g	Mass of 5 mol H atoms	5 mol x 1.01 g/mol = 5.05 g
Mass of 5 dz large eggs	5 dz x 684 g/dz = 3420 g	Mass of 5 mol S atoms	5 mol x 32.06 g/mol = 160.3 g
Mass of 5 dz small eggs	5 dz x 516 g/dz = 2580 g	Mass of 5 mol O atoms	5 mol x 16.00 g/mol =80.00 g