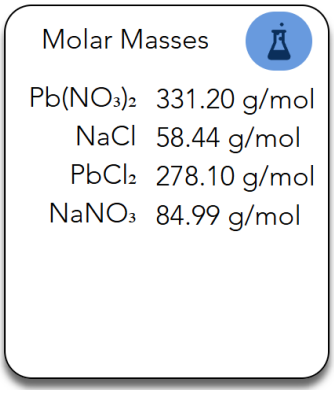
Limiting and Excess Reactants

Example One

If 4.0 moles aqueous lead(II) nitrate and 3.0 moles of sodium chloride react, what mass of your precipitate will be formed?

$$Pb(NO_3)_2\ (aq) + 2NaCl\ (aq) \rightarrow PbCl_2\ (s) + 2NaNO_3\ (aq)$$



Example Two

For the following equation, how many grams of lead (II) chloride can be produced from 8.0 moles of sodium chloride and 2.0 moles of lead (II) phosphate.

$$6\ NaCl + Pb_3(PO_4)_2 \rightarrow 2\ Na_3PO_4 + 3\ PbCl_2$$

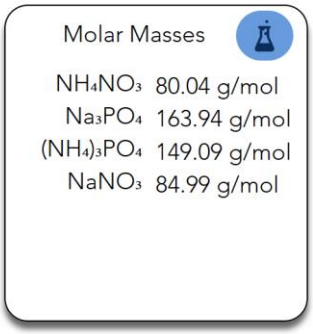
Molar Masses	
NaCl	58.44 g/mol
$Pb_3(PO_4)_2$	811.54 g/mol
Na_3PO_4	163.94 g/mol
$PbCl_2$	278.10 g/mol

Example Three

Consider the following reaction:

$$3\ NH_4NO_3 + Na_3PO_4 \rightarrow (NH_4)_3PO_4 + 3\ NaNO_3$$

If we started with 30.0 grams of ammonium nitrate and 50.0 grams of sodium phosphate, how much sodium nitrate could we produce?



Example Four

Suppose you combine 10.0 grams of hydrogen gas and 15.0 grams of oxygen gas to make water. How many grams of water vapor are made? How much excess remains?

$$2\ H_2 + O_2 \rightarrow 2\ H_2O$$

Molar Masses

H_2	2.02 g/mol
O_2	32.00 g/mol
H_2O	18.02 g/mol

Example Five

Given the following reaction:

$C_3H_8 + 5\ O_2 \rightarrow 3\ CO_2 + 4\ H_2O$

a) If you start with 14.8 g of C_3H_8 and 3.44 g of O_2, determine the limiting reagent
b) determine the number of moles of carbon dioxide produced
c) determine the number of grams of H_2O produced
d) determine the number of grams of excess reagent left