Chemical Reactions Worksheet Name _____
Chem 140

Types of Chemical Reactions

1) Combination (syntheses) Reactions (A + B → C)

- Magnesium metal reacts with oxygen gas to form solid magnesium oxide.
(write the balanced rxn below; include physical states)

- Iron metal reacts with oxygen gas to form solid iron(III) oxide.
(write the balanced rxn below; include physical states)

2) Decomposition Reactions (C → A + B)

- Aqueous hydrogen peroxide (H_2O_2) decomposes into liquid water and oxygen gas.
(write the balanced rxn below; include physical states)

- Solid sodium azide (NaN_3) decomposes into sodium metal and nitrogen gas.
(write the balanced rxn below; include physical states)

3) Combustion Reaction [fuel + $O_2(g)$ → $CO_2(g)$ + $H_2O(g)$]

- propane gas (C_3H_8) combusts!
(write the balanced rxn below; include physical states)

- ethanol (C_2H_5OH) combusts!
(write the balanced rxn below; include physical states)

Quantitative Information from Balanced Reactions

A) Type of questions (moles → moles):

- Given the ***moles*** of ***reactant*** used, calculate the ***moles*** of ***product*** formed.
- Given the ***moles*** of ***product*** formed, calculate the ***moles*** of **reactant*(s)*** needed.
- In a two reactant rxn, given the ***moles*** of one reactant, calculate the ***moles*** of another reactant.

All ***moles → moles conversations***…always use the stoichiometric coefficients in the balanced rxn.

- Given 1 mole of Mg(s), how many moles of MgO(s) are formed?
  (Show your work)

- Given 2 moles of H_2O_2(aq), how many moles of O_2(g) can be generated?
  (Show your work)

- Given that 2.31 moles of Fe_2O_3(s) is formed, how many moles of O_2(g) are consumed?
  (Show your work)

- How many moles of ethanol(l) is consumed when 0.231moles of O_2(g) are consumed?
  (Show your work)

Quantitative Information from Balanced Reactions (cont.)

B) Type of questions (grams → grams):

- Given the ***grams*** of ***reactant*** used, calculate the ***grams*** of ***product*** formed.
- Given the ***grams*** of ***product*** formed, calculate the ***grams*** of **reactant*(s)*** needed.
- In a two reactant rxn, given the ***grams*** of one reactant, calculate the ***grams*** of another reactant.

All ***grams → grams*** conversations ***involve 3 steps***…

1) ***gram → moles***, use the molar mass/formula weight of the reactant or product.
2) ***moles → moles***, use stoichiometric coefficients from balanced reaction.
3) ***moles → grams***, use the molar mass/formula weight of the reactant or product.

- Given 3.12 grams of Mg(s), how many grams of MgO(s) are formed?

- first…what is the molar mass of Mg(s)? _____ g/mol
- STEP 1: grams → moles conversation…*(Show your work)*

- STEP 2: moles → moles conversion…*(Show your work)*

- next…what is the molar mass of MgO(s)? _____ g/mol
- STEP 3: moles → grams conversation…*(Show your work)*

- Given 23.1 grams of H_2O_2(aq), how many grams of O_2(g) can be generated?

- first…what is the molar mass of H_2O_2(aq)? _____ g/mol
- STEP 1: grams → moles conversation…*(Show your work)*

- STEP 2: moles → moles conversion…*(Show your work)*

- next…what is the molar mass of O_2(g)? _____ g/mol
- STEP 3: moles → grams conversation…*(Show your work)*

- Given that 2.13 grams of $Fe_2O_3(s)$ is formed, how many grams of $O_2(g)$ are consumed?

  - first…what is the molar mass of $Fe_2O_3(s)$? _____ g/mol (*show work* →)
  - STEP 1: grams → moles conversation…*(Show your work)*

  - STEP 2: moles → moles conversion…*(Show your work)*

  - next…what is the molar mass of $O_2(g)$? _____ g/mol
  - STEP 3: moles → grams conversation…*(Show your work)*

- How many grams of ethanol is consumed when 32.1 grams of $O_2(g)$ are consumed?

  - first…what is the molar mass of $O_2(g)$? _____ g/mol
  - STEP 1: grams → moles conversation…*(Show your work)*

  - STEP 2: moles → moles conversion…*(Show your work)*

  - next…what is the molar mass of ethanol? _____ g/mol
  - STEP 3: moles → grams conversation…*(Show your work)*