

Chm.2.2.2 Analyze the evidence of chemical change

Students should be able to determine if a chemical reaction has occurred based on the following criteria:

(questions 6, 7, 8, 10, 11)

- Precipitate formation (tie to solubility rules)
- Product testing - Know the tests for some common products such as oxygen, water, hydrogen and carbon dioxide: burning splint for oxygen, hydrogen or carbon dioxide, and lime water for carbon dioxide. Include knowledge and application of appropriate safety precautions.
- Color Change – Distinguish between color change as a result of chemical reaction, and a change in color intensity as a result of dilution.
- Temperature change – Tie to endothermic/exothermic reaction. Express ΔH as (+) for endothermic and (–) for exothermic.

Chm.2.2.3 Analyze the law of conservation of matter and how it applies to various types of chemical equations (synthesis, decomposition, single replacement, double replacement, and combustion)

- Write and balance chemical equations predicting product(s) in a reaction using the reference tables. (questions 1, 2, 4, 5, 6, 7, 8)
- Identify acid-base neutralization as double replacement. (questions 5, 7)
- Write and balance ionic equations. (questions 5, 6, 7, 8)
- Write and balance net ionic equations for double replacement reactions. (question 7)
- Recognize that hydrocarbons (C,H molecule) and other molecules containing C, H, and O burn completely in oxygen to produce CO_2 and water vapor. (questions 6, 8)
- Use reference table rules to predict products for all types of reactions to show the conservation of mass. (questions 3, 6, 7, 8)
- Use activity series to predict whether a single replacement reaction will take place. (questions 6, 7, 8, 9)
- Use the solubility rules to determine the precipitate in a double replacement reaction if a reaction occurs. (questions 6, 7, 8)

Practice Questions:

1) What fundamental law of chemistry requires that equations be balanced?

2) What do the following symbols mean in a chemical equation?

a) (g)

d) (aq)

b) (l)

e) $\xrightarrow{\Delta}$

c) (s)

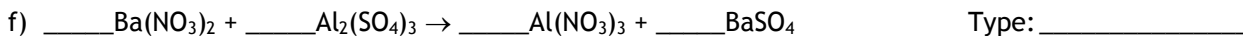
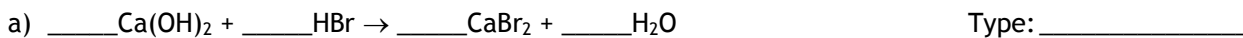
f) \xrightarrow{KI}

3) Fill in the table to remind you of how to recognize a type of reaction based on just the reactants.

When the Reactants Are:	It Means the Reaction is:	Example:
A hydrocarbon and oxygen	Combustion	$2 \text{C}_2\text{H}_6 + 7 \text{O}_2 \rightarrow 4 \text{CO}_2 + 6 \text{H}_2\text{O}$
	Synthesis	
	Decomposition	
	Single Displacement	
	Double Displacement	

4) Identify the seven diatomic elements.

5) Balance the following equations by adding coefficients. Identify the type of each reaction.



6) - Write a balanced chemical equation.
- Include the states of matter (Use Solubility Rules, when needed!)

a) Copper metal will react with liquid bromine to make solid copper (I) bromide.

b) Cyclohexane, $\text{C}_6\text{H}_{12(l)}$, burns in the presence of oxygen to give carbon dioxide and water vapor.

c) Solid calcium carbonate decomposes upon heating to form solid calcium oxide and a gas.

- 7) - Write a balanced chemical equation.
- Include the states of matter (Use Solubility Rules, when needed!)
- Circle the spectator ions
- Write the net ionic equation.
- a) Aqueous sodium carbonate reacts with aqueous silver nitrate to make silver carbonate and sodium nitrate.

b) Zinc will react with aqueous tin (IV) bromide to make tin and zinc bromide.

c) Hydrochloric acid reacts with aqueous strontium hydroxide to make strontium chloride and water.

8) Given just the reactants, identify the type of reaction and write a balanced equation.

a) $\text{CaCl}_2 + \text{AgNO}_3 \rightarrow$ Type: _____

b) $\text{N}_2 + \text{Mg} \rightarrow$ Type: _____

c) $\text{Zn} + \text{CuNO}_3 \rightarrow$ Type: _____

d) $\text{C}_5\text{H}_{12} + \text{O}_2 \rightarrow$ Type: _____

e) $\text{Ba(OH)}_2 + \text{Na}_2\text{SO}_4 \rightarrow$ Type: _____

f) $\text{Cu(OH)}_2 \rightarrow$ Type: _____

9) Use your activity series to tell which of the following combinations of reactants will react.
Circle the pair that will react.

- | | | |
|----|-----------------------------------|---------------------------------------|
| a) | AgNO_3 and Cu | $\text{Cu}(\text{NO}_3)_2$ and Ag |
| b) | $\text{Mg}(\text{NO}_3)_2$ and Fe | $\text{Fe}(\text{NO}_3)_2$ and Mg |
| c) | CaCl_2 and Pb | PbCl_2 and Ca |
| d) | HCl and Pt | PtCl_6 and H_2 |
| e) | K and H_2O | H_2 and K_2O |

10) Identify as either a physical (P) property or a chemical (C) property:

- a) ___ Hardness
- b) ___ Density
- c) ___ Aluminum reacts with hydrochloric acid to form hydrogen gas.
- d) ___ Ethanol boils at 78.4°C .
- e) ___ Vinegar is volatile.
- f) ___ Table salt is composed of Na and Cl.
- g) ___ Sugar dissolves in water.

11) Identify as examples of Physical Changes (P) or Chemical Changes (C):

- a) ___ glass breaking
- b) ___ spoiling food
- c) ___ mixing lemonade powder
into water
- d) ___ bleaching your hair
- e) ___ fireworks exploding
- f) ___ frying an egg
- g) ___ cream being whipped
- h) ___ freezing chocolate covered
bananas