Key

Chapter 14 Review

1. Why do we use an equation for a chemical reaction that correctly preserves the number and type of atoms on both sides of the reaction?

   To comply with the Law of Conservation of mass - mass is neither created or destroyed in a chemical reaction

2. What is the number in an equation that designates the number of molecules of a substance taking part in a chemical reaction called?

   Coefficient $\quad 2\,H_2 + O_2 \rightarrow 2\,H_2O$

3. What is the substance formed in a chemical reaction called?

   product(s)

4. What are the starting substances in a chemical reaction called?

   reactant(s)

5. What is the solid product that comes out of solution in a chemical reaction called?

   precipitate

6. Define the following terms:
   a. (aq), (s), (l), (g)

      aqueous (in solution), solid, liquid, gas

   b. activation energy

      Energy required for a reaction to occur

   c. coefficient (in a chemical equation)

      # in front of a substance in a chemical equation that represents the # of particles of the substance.

   d. subscript (in a chemical formula)

      lower # after an element which designates how many of that atom.

   e. precipitate

      solid substance that comes out of solution

   f. endothermic/exothermic

      Endo: energy absorbed

      exo: energy released

g. alpha radiation

Emission of Alpha particles ($^{4}_{2}He$) α

2 p^+ & 2n

h. beta radiation

Emission of Beta particles (e^-) β

(neutron breaks into p^+ & e^- and e^- is emitted)

i. gamma radiation

High energy electromagnetic radiation γ

j. half-life

Amount of time required for 1/2 of a radioisotope to decay

k. fusion/fission

Fusion: combining of nuclei

Fission – splitting of nuclei

7. How many kilo, deci, centi, and milli grams are in 1 gram?

1 Kg = 1000 g

1000 mg = 1g

10 dg = 1g

100 cg = 1g

8. Write the balanced equation for the following reaction: The fuel used in gas grills is called propane (C_3H_8). Propane reacts with oxygen gas (O_2) found in the air to produce carbon dioxide (CO_2) and water vapor (H_2O).

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

9. Is the following reaction endothermic or exothermic?

$NH_4NO_{3(s)} + H_2O_{(l)}$ + energy $\rightarrow NH_4^{+1}{}_{(aq)} + NO_3^{-1}{}_{(aq)} + H_2O_{(l)}$

Endothermic

10. Name three examples of radiation that you might encounter in your environment?

Cell phones, air travel, xrays, basements, space

brick/stone buildings, bananas, Brazil nuts

11. What radioactive technique is used to determine the age of fossils?

Carbon-Dating

12. Carbon-14 undergoes beta decay to become another element.

a. What is the product of the radioactive decay?

$^{14}_{6}C \rightarrow ^{14}_{7}N + e^-$

b. What is the new element?

Nitrogen-14

13. Complete the table below for the indicated radioactive decay reactions.

Type of decay	Proton change	Neutron change	Atomic # change	Mass # change
Alpha decay	-2	-2	-2	-4
Beta decay	+1	-1	+1	Ø
Gamma decay	Ø	Ø	Ø	Ø

14. What does the Law of Conservation of Mass state?

Mass cannot be created or destroyed in a chemical reaction or physical change.

15. In the chemical equation below:

$C_6H_{12}O_6 + 6\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O$

a. What are the reactants?

$C_6H_{12}O_6$ & O_2

b. What are the products?

$CO_2 + H_2O$

c. What does the arrow mean?

"to form" or "yields"

16. Describe the five types of reactions.

- Synthesis: $A + B \rightarrow AB$ Two or more substances combine to form one product
- Decomposition: $AB \rightarrow A + B$ One compound breaks down into 2 or more substances
- Single Displacement: $A + BX \rightarrow AX + B$
  An element replaces a similar element in a compound.
- Double Displacement: $AB + CD \rightarrow AD + CB$
  Ions exchange places. Produces either a precipitate, a gas, or water.
- Combustion: substances combines with oxygen to produce energy
  synthesis with O_2 or Carbon compound $+ O_2 \rightarrow CO_2 + H_2O$

17. Balance the following equations and indicate what type of reaction it is.

a. 2 H_2 + ___ O_2 → 2 H_2O

Synthesis

b. 2 Mg + ___ O_2 → 2 MgO

Synthesis

c. ___ Ca + 2 H_2O → ___ $Ca(OH)_2$ + ___ H_2

Single

d. ___ Cu + 2 $HgNO_3$ → ___ $Cu(NO_3)_2$ + 2 Hg

Single

e. ____C_3H_8 + 5 O_2 → 3 CO_2 + 4 H_2O

combustion

f. 2 Al + 3 F_2 → 2 AlF_3

synthesis

g. ____$C_6H_{12}O_6$ + 6 O_2 → 6 CO_2 + 6 H_2O

combustion

h. ____Fe_3O_4 + 4 H_2 → 3 Fe + 4 H_2O

single

i. ____Al_2O_3 + 6 HCl → 2 $AlCl_3$ + 3 H_2O

double

j. 3 NH_4OH + ____$FeCl_3$ → ____$Fe(OH)_3$ + 3 NH_4Cl

double

k. 3 CaO + ____P_2O_5 → ____$Ca_3(PO_4)_2$

synthesis