Review for particle model, balancing equations, neutralization and combustion test

Changes:

1. State whether the following are examples of chemical or physical changes.

   a- cooking chicken
   b- evaporating water
   c- after 2 substances are mixed, the substance turns yellow
   d- the windshield wiper of a car has droplets of water on it in the morning
   e- the clothes on a clothes line dry after 3 hours in the sun
   f- A precipitate is formed after mixing 2 substances.
   g- Making Jell-O

Particle model:

1. **Represent the following with symbols.**

	Symbol		Symbol
CO_2		2 Na_2SO_4	
6 Na		2 $Mg(OH)_2$	
3 O_3		CH_3COOH	

2. **Represent each equation using the particle model.**

a- $N_2 + 3\ H_2 \rightarrow 2\ NH_3$

b- $2\ KNO_3 \rightarrow 2\ KNO_2 + O_2$

c- $CO_2 + 2\ KOH \rightarrow K_2CO_3 + H_2O$

3. Balance the equations below.

1. $Al + O_2 \rightarrow 2\ Al_2O_3$
2. $Pb(NO_3)_2 + 2\ KI \rightarrow PbI_2 + KNO_3$
3. $Cl_2 + 2\ Na \rightarrow NaCl$
4. $NH_3 + Cl_2 \rightarrow HCl + N_2$
5. $N_2 + O_2 \rightarrow N_2O_5$
6. $C_2H_5OH + O_2 \rightarrow 2\ CO_2 + H_2O$
7. $N_2 + O_2 \rightarrow 2\ N_2O_5$
8. $C_3H_8 + 5\ O_2 \rightarrow CO_2 + H_2O$
9. $Cu_2S + 2\ O_3 \rightarrow Cu_2O + 2\ SO_2$
10. $Mg_3N_2 + 3\ H_2O \rightarrow MgO + NH_3$

4. Mass

1. The balanced equation for a particular chemical reaction is

$$NaNO_3 + H_2SO_4 \rightarrow NaHSO_4 + HNO_3$$

In the laboratory, you react 8.5 g of $NaNo_3$ with 9.8 g of H_2SO_4 and obtain 12.0 g of $NaHSO_4$ and a certain quantity of HNO_3. What is this quantity of HNO_3?

Neutralization

1. Give an example of a neutralization reaction.

2. Which 2 products are always produced during a neutralization reaction?

3. Explain the drop and swirl technique

Combustion

1. Give the definition of the following words.

Combustion	
Oxidation	
Fuel	
Ignition temperature	
Oxidizing agent	
Spontaneous combustion	
Rapid combustion	
Slow combustion	

2. What are the differences between photosynthesis and respiration?

Multiple choice practice and short answer

1. Given the following equation : $HI_{(aq)} + KOH_{(aq)} \rightarrow KI_{(aq)} + H_2O_{(1)}$
   Which reaction is represented?

A) Synthesis B) Oxidation C) Precipitation D) Neutralization

2. Sophie analyzes the reaction between two solutions she used in an experiment. The following is a description of her work.

1. Properties Observed

SOLUTION 1	SOLUTION 2
. is a good conductor of electricity,	. is a good conductor of electricity,
. is colourless,	. is colourless,
. turns blue litmus paper red,	. turns red litmus paper blue,
. turns cobalt chloride paper pink.	. turns cobalt chloride paper pink.

2. Preparation of Solution 3
   She prepares the third solution by mixing equal amounts of solutions 1 and 2.

3. Properties of Solution 3
   . is a good conductor of electricity,
   . is colourless,
   . does not change the colour of litmus paper,
   . turns cobalt chloride paper pink.

Which equation could precisely represent the reaction between solutions 1 and 2?

A) $NaOH + HCl \rightarrow NaCl + H_2O$
B) $HCl + NaOH \rightarrow NaCl + H_2O$
C) $NaOH + HCl \rightarrow NaOH + HCl$
D) $NaCl + H_2O \rightarrow HCl + NaOH$

3. Which of the following equations represents an acid-base neutralization reaction?

A) $CH_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O$
B) $6\ CO_2 + 6\ H_2O \rightarrow C_6H_{12}O_6$
C) $Mg + 2\ HCl \rightarrow H_2 + MgCl_2$
D) $Ca(OH)_2 + 2\ HCl \rightarrow CaCl_2 + 2\ H_2O$

4. In neutralizing sulfuric acid, H_2SO_4, with caustic soda, NaOH, sodium sulfate, NA_2SO_4, and water are produced. Which equation represents this chemical reaction?

A) $H_2SO_4 + 2\ NaOH \rightarrow Na_2SO_4 + 2\ H_2O$
B) $Na_2SO_4 + 2\ H_2O \rightarrow H_2SO_4 + 2\ NaOH$
C) $H_2SO_4 + NaOH \rightarrow Na_2SO_4 + 2\ H_2O$
D) $Na_2SO_4 + H_2O \rightarrow H_2SO_4 + 2\ NaOH$

5. The reaction caused by the burning of butane in air is represented by the following equation: $2\,C_4H_{10(g)} + 13\,O_{2(g)} \rightarrow 8\,CO_{2(g)} + 10\,H_2O_{(g)}$ + Energy

During a laboratory experiment, you react 29 g of butane (C_4H_{10}) in the presence of oxygen (O_2). You observe that 88 g of carbon dioxide (CO_2) and 45 g of water vapour (H_2O) form.
What mass of oxygen did you use in this experiment?

A) 59 g B) 104 g C)133 g D) 162 g

6. While consulting some old documents, you find a lab report written in 1968. Here is part of the document.

Experiment Results

mass of Pb $(NO_3)_2$ before reaction : 3.31 g
mass of NaI before reaction : 3.00 g
mass of PbI_2 after reaction : 4.61 g
mass of Na NO_3 after reaction :

Conclusion : The results of this experiment confirm Law of Conservation of Mass

$Pb(NO_3)_2 + 2\,NaI \rightarrow PbI_2 + 2\,NaNO_2$

3.31 g 3.00 g 4.61 g

You notice that the mass of one of the products, $NaNO_3$ is missing. If all of the reactants were used up, what must be the missing mass of $NaNO_3$?

7. The combustion of heptane, C_7H_{16}, produces carbon dioxide, CO_2, and water vapour, H_2O, as indicated in the following unbalanced equation :

$$C_7H_{16} + O_2 \rightarrow CO_2 + H_2O$$

Balance this equation.

8. The following equation represents the reaction that occurs when a solution of hydrogen bromide is combined with a solution of lithium hydroxide :

$$HBr + LiOH \rightarrow \boxed{\text{product 1}} + \boxed{\text{product 2}}$$

The products are not identified in the above equation.
Identify these products.

9. In neutralizing sulfuric acid, H_2SO_4, with caustic soda, NaOH, sodium sulfate, Na_2SO_4, and water are produced.

Which equation represents this chemical reaction?

A) $H_2SO_4 + 2\ NaOH \rightarrow Na_2SO_4 + 2\ H_2O$

B) $Na_2SO_4 + 2\ H_2O \rightarrow H_2SO_4 + 2\ NaOH$

C) $H_2SO_4 + NaOH \rightarrow Na_2SO_4 + 2\ H_2O$

D) $Na_2SO_4 + H_2O \rightarrow H_2SO_4 + 2\ NaOH$

10. A basic solution of NaOH was neutralized with an acidic solution of H_3PO_4. Which of the following is the balanced equation representing this neutralization reaction?

A) $NaOH + H_3PO_4 \rightarrow Na_3PO_4 + H_2O$

B) $3\ NaOH + H_3PO_4 \rightarrow Na_3PO_4 + H_2O$

C) $3\ NaOH + H_3PO_4 \rightarrow Na_3PO_4 + 3\ H_2O$

D) $3\ NaOH + 2\ H_3PO_4 \rightarrow Na_3PO_4 + 3\ H_2O$

11. Combustion is a chemical reaction that occurs under certain conditions.

The fire triangle below illustrates the conditions required for combustion to occur

Ignition temperature

A friend shows you the three conclusions she arrived at after doing her research on forest fires:

a) If the wind increases, the forest fire will also increase.

b) Forest fires are more common in summer, when it is hot and dry, than in autumn, when it is cold and wet.

c) Forest fires are more likely to occur in mature forests than in young forests.

Justify each of the conclusions by using the fire triangle.

a _____

_____

b_____

_____

c_____

_____