

## Practice questions – Changes in Matter

### *Law of Conservation of Mass, Chemical and Physical Changes, Acids & Bases, pH and neutralization*

*Multiple choice instructions:* In your study group, answer the following questions. Use your notes, labs and book to help you. Then, once you have determined the answer to the question, **write a short explanation of why you chose that answer in your ISN.**

1. A chemical change is different than a physical change because in a chemical change
  - a) Chemicals are used
  - b) Molecules do not physically touch
  - c) A new substance is formed and in a physical change no new substance is formed
  - d) The change can be seen but in a physical change it cannot
2. In a chemical reaction
  - a) The atoms of the reactants always stay together to form the products
  - b) The atoms of the reactants “unbond”, rearrange, and then rebond to form the products
  - c) New atoms are formed which combine to make the products
  - d) Some atoms disappear while others multiply to form the products
3. In the chemical reaction  $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$ , there are reactants on the left of the equation and products on the right. If you count the atoms in the reactants, there are
  - a) 4 carbon atoms, 4 hydrogen atoms, and 2 oxygen atoms
  - b) 1 carbon atom, 4 hydrogen atoms, and 2 oxygen atoms
  - c) 1 carbon atom, 4 hydrogen atoms, and 4 oxygen atoms
  - d) 4 carbon atoms, 4 hydrogen atoms, and 4 oxygen atoms
4. In a chemical reaction, mass is conserved. This means that
  - a) The mass of the reactants stays the same during a chemical reaction
  - b) The mass of the products stays the same during a chemical reaction
  - c) The type and number of atoms in the reactants equals the type and number of atoms in the products
  - d) The mass of the products is always twice the mass of the reactants.
5. If the reactants on the left side of a chemical equation are  $\text{C}_3\text{H}_8 + 5\text{O}_2$ , the products in a balanced equation could be
  - a)  $4\text{CO}_2 + 3\text{H}_2\text{O}$
  - b)  $3\text{CO}_2 + 4\text{H}_2\text{O}$
  - c)  $2\text{CO}_2 + 3\text{H}_2\text{O}$
  - d)  $3\text{CO} + 4\text{H}_2\text{O}$

6. If more reactants are used in a chemical reaction, more products will be produced. This is because
- More reactants cause the reaction to heat up
  - More reactants take up the same volume
  - More reactants have more atoms to react to form more products
  - Too many products can slow down the reaction
7. In a chemical reaction, Substance A reacts with Substance B and forms a new substance AB. The chemical equation for this reaction is  $A + B = AB$  where A and B are the reactants and AB is the product. If you add more and more of only Substance A, there will be
- Less and less of product AB
  - More and more of product AB with no limit to the amount of AB produced
  - No change in the amount of AB produced
  - More and more of product AB but limited by the amount of B
8. In any sample of water, there are always some water molecules which have become ions. These ions are
- $H_2O^+$  and  $OH^-$
  - $HO^+$  and  $H_2O^-$
  - $H_3O^+$  and  $OH^-$
  - $HO^+$  and  $HO^-$
9. When the pH of water is neutral, there is
- a higher concentration of  $OH^-$  than  $H_3O^+$
  - an equal concentration of  $OH^-$  and  $H_3O^+$
  - a higher concentration of  $H_3O^+$  than  $OH^-$
  - no  $OH^-$  ions and no  $H_3O^+$  ions
10. When the pH of a solution becomes more acidic, the number on the pH scale
- Decreases
  - Increases
  - Stays the same
  - Doubles
11. When the pH of a solution becomes more basic, the number on the pH scale
- Decreases
  - Increases
  - Stays the same
  - Triples
12. When the pH of a solution becomes more acidic, the concentration of  $H_3O^+$  ions
- Decreases
  - Increases
  - Stays the same
  - Doubles

13. When the pH of a solution becomes more basic, the concentration of  $\text{H}_3\text{O}^+$  ions
- Decreases
  - Increases
  - Stays the same
  - Triples
14. If a solution is acidic, it can be neutralized by adding
- A stronger acid
  - Heat
  - A base
  - A weaker acid
15. If a solution is basic, it can be neutralized by adding
- An acid
  - A weaker base
  - More base
  - A colder base

***True/False instructions:*** In your study group, determine if the following statements are true or false. Use your notes, labs and book to help you. Then, **write a short group explanation of why the statement is false or give evidence to support why you think the statement is true.**

- Dissolving salt is a chemical reaction.
- In a chemical reaction, only the atoms present in the reactants can end up in the products.
- In a chemical reaction, no new atoms are created, but some atoms can be destroyed.
- If substance A and substance B combine to form a product AB, adding more and more A would create more product even without adding B.  
$$A + B \rightarrow AB$$
- When something is burned, matter is destroyed.
- There are  $3\text{H}_2\text{O}$  six oxygen atoms in this formula.
- A solution with a pH of 3 is 10 times more acidic than a solution with a pH of 4.
- An acid has a pH more than 7.
- An acid has a high concentration of  $\text{H}_3\text{O}^+$
- When a base is added to an acid, the pH of the acid increases.
- Bases taste sour.
- A pH indicator can change color to show the pH of a solution.
- Ice melting is a chemical change.
- Water and salt go through a chemical reaction to make salt water.
- If you heat up a chemical reaction, it usually slows down.
- You can destroy atoms in a chemical reaction by burning them.
- Photosynthesis is an example of a chemical reaction.
- The purpose of cellular respiration is to use up oxygen.

*Discussion instructions: In your study group, discuss the following questions. **Everyone should write an answer down in their ISN for these questions.***

1. How do you know if a chemical equation is balanced?
2. What is a pH indicator? Give an example of one and how it works.
3. Describe the properties of an acid.
4. When an acid and a base are combined, a neutralization reaction occurs. There are two products: water and a salt. Why do you think we don't see the salt after the neutralization?
5. When two water molecules come together, it is possible for a proton or a  $H^+$  ion from a hydrogen atom in one water molecule to bond to the oxygen atom in the other. Draw a picture of the two ions that form and give their chemical formula.
6. Carbon dioxide from different sources can react with water to form carbonic acid. Why do you think that carbon dioxide from different sources can cause the same reaction with water?