Chemical change Chemistry Questions with Solutions

Q1: State whether the combination of hydrogen and oxygen to form water is a chemical or physical change.

Answer: In the given process, a new substance i.e. Water is formed. The properties of water are entirely different from those of hydrogen and oxygen. Alos, once formed, water cannot be converted back into hydrogen and oxygen by any physical method. Hence, this is a chemical change.

Q2. Which of the following properties do not change in both the chemical and physical changes?

a. Arrangement of particles
b. Size and shape of the particle
c. Density
d. Mass

Answer: (d.)

Explanation: The chemical and physical changes follow the law of conservation of mass. Hence, mass does not change.

Q3. On placing an iron nail in the acidified solution of copper (II) sulphate, the colour of the solution changes from blue to green. State the reason behind this change.

Answer: The copper (II) sulphate solution undergoes a chemical change when it comes in contact with the iron nail. The following reaction takes place in the solution:
$CuSO_4$ (aq) + Fe (s) → $FeSO_4$ (aq) + Cu (s)
As a result, the blue $CuSO_4$ solution turns green and the iron nail turns brown (due to deposited solid copper). This is a displacement reaction.

Q4. Three jars A, B and C are taken. Jar A is half-filled with tap water. Jar B is half-filled with water which was boiled for a few minutes. Jar C is half-filled with the same boiled water as in jar B. In all the three jars, an iron nail is dropped. In jar C, after the addition of the iron nail, some oil is added so that a film covers the surface of water. The jars are kept for and opened after 10 days, the nail in jar A is completely rusted, the nail in jar B is slightly rusted; while; the nail in jar C has not rusted at all. Give reason for these observations.

Answer: For the rusting of iron, both water and oxygen are necessary. Jar A was filled with tap water which has dissolved oxygen in it, hence, on keeping an iron nail in this water, the nail gets rusted. Jar B contains boiled water, on boiling the dissolved oxygen is removed but as since the jar was kept open,

some amount of oxygen must have again dissolved from the air into the water; hence, the iron nail got slightly rusted. While in Jar C, the boiled water was covered with a film of oil leaving no contact of water with the air. Hence, the nail in jar C did not get rusted at all.

Q5. Is cooking a chemical change? List some of the changes by which you can confirm the same.

Answer: Cooking of food is a chemical change. We can confirm this by the following changes:

a. The colour of the food changes permanently.
b. The smell of the food changes.
c. The temperature of the food rises.
d. The shape and size of the food changes.
e. We cannot get the initial raw materials back from cooked food.
f. Gases are evolved.

Q6. Tick the correct answer.
In a chemical reaction:

a. The reactants always stay together to form the products.
b. The reactants form new atoms. The new atoms form the products.
c. The number of a few atoms decreases while that of some atoms increases to form the products.
d. The reactants' atoms unbond, rearrange and then rebond to form the products.

Answer: (d)

Explanation: In order to make a new substance, the old bonds of the existing substance must be broken. The free atoms or molecules thus formed must arrange or rearrange in a manner such that new bonds in between them result in the products.

Q7. The balanced chemical equation for the rusting of iron is:
$4Fe\ (s) + 3O_2\ (g) \rightarrow 2Fe_2O_3\ (s)$
How many atoms of each of Fe and O are there each on the reactants side and the products side?

a. 4 Fe and 3 O_2 on the reactants side and 2 Fe and 1 O_3 on the products side.
b. 4 Fe and 6 O_2 on the reactants side and 2 Fe and 2 O_3 on the products side.
c. 4 Fe and 3 O_2 on the reactants side and 2 Fe_2O_3 on the product side.
d. 4 Fe atoms and 6 oxygen atoms on both sides.

Answer: (d.)

Explanation: Chemical reactions follow the law of conservation of mass which is why the number or the mass of each atom remains unchanged throughout the reaction.

Q8. From the following reasons, which one best explains the fact that more reactants lead to the formation of more products.

a. More products can heat up the reaction.
b. More reactants take more volume.
c. More reactants become charged.
d. More reactants have more atoms to react to form more products.

Answer: (d)

Explanation: More reactants have more atoms that unbond and rebond in a different manner to form the products.

Q9. State true or false: In neutral water, no OH^- and H_3O^+ exist.

Answer: False.

Explanation: For a solution to be neutral, the number of OH^- and H_3O^+ ions must be equal.

Q10. Fill in the blanks with the suitable word.
It takes _____ to break the bonds and ____ is released when new bonds are formed.

Answer: Energy, energy

Explanation: To break a stable compound, the bonds in the compound are broken. This is done by providing some energy externally. However, when new bonds are formed, the energy is given out.

Q11. Why do atoms bond?

Answer: Atoms bond with each other in order to achieve a low energy state.

Q12. What is the major difference between a chemical and a physical change?

Answer: In a chemical change, the atomic bonds of the reactants break and form new bonds to make an entirely new product. The product formed has different properties than the reactants. While in a physical change, no new product is formed. A physical change may be referred to as the change in the phase of the substance which does not require any chemical change.

Q13. What does the term- “The atoms are neither created nor destroyed” mean?

Answer: This means that during a chemical reaction, no new atoms can be formed or destroyed within the reaction. Hence, an equal number of atoms of the reacting species must appear in products as well.

Q14. If we add vinegar to baking soda, some gas is evolved. Will the gas continue to evolvel if we keep on adding the vinegar?

Answer: On adding vinegar to the baking soda, carbon dioxide (CO_2) gas is evolved. If we keep adding the vinegar in excess, the carbon dioxide gas will be evolved only till the whole of the baking soda reacts with the vinegar. Once all the baking soda is used up, the reaction will stop and no more evolution will occur.

Q15. What is Evaporation? Is it a chemical change?

Answer: Vaporization occurring from the surface of the liquid to convert it into a gas is called Evaporation. It is not a chemical change.

Practise Questions on Chemical change

Q1. Why is Evaporation not a chemical change?

Answer: Evaporation is the change of state of water from liquid to gas. Since during the change of phase of a substance, the bonds of the atoms present in the given compound do not break, evaporation is not a chemical change.

Q2. Does the size of one of the reactants affect the chemical reaction?

Answer: The chemical reaction occurs in between the molecules or atoms of the substance, hence, the size of the reactant does not affect the chemical reaction significantly.

Q3. How can we bring a chemical change into a substance?

Answer: The chemical change can be brought out by:

a. Providing heat
b. Providing light
c. Providing Energy
d. Providing electricity
e. Bringing a more reactive substance in the close vicinity of the less reactive substance.
f. Changing pressure

Q4. Would decreasing the temperature of the reactants slow down the chemical reaction?

Answer: Lowering the temperature may reduce the speed at which the reactant molecules collide with each other and hence, slow down the reaction.

Q5. In terms of making or breaking of bonds, explain the endothermic and exothermic reactions.

Answer: In a chemical reaction, energy is given to break the pre-existing / old bonds of the atoms of the reactants and energy is released when new bonds in between the rearranged atoms are formed.

When the energy given to break the bonds in between the atoms of the reactants is more than the energy released during the formation of the products, the reaction is endothermic.
When the energy released during the formation of products is more than the energy given to break the bonds in between the atoms of the reactants, the reaction is exothermic.