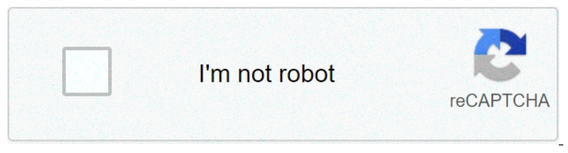

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Conservation of mass worksheet chemistry answer key

It may seem as though burning destroys matter, but the same amount, or mass, of matter still exists after a campfire as before. Look at Figure \(\PageIndex{1}\) below. It shows that when wood burns, it combines with oxygen and changes not only to ashes, but also to carbon dioxide and water vapor. The gases float off into the air, leaving behind just the ashes. Suppose you had measured the mass of the wood before it burned and the mass of the ashes after it burned. Also suppose you had been able to measure the oxygen used by the fire and the gases produced by the fire. What would you find? The total mass of matter after the fire would be the same as the total mass of matter before the fire. Figure \(\PageIndex{1}\): Burning is a chemical process. The flames are caused as a result of a fuel undergoing combustion (burning). (CC BY-SA 2.5; Einar Helland Berger for fire and Walter Siegmund for ash). The law of conservation of mass was created in 1789 by a French chemist, Antoine Lavoisier. The law of conservation of mass states that matter cannot be created or destroyed in a chemical reaction. For example, when wood burns, the mass of the soot, ashes, and gases equals the original mass of the charcoal and the oxygen when it first reacted. So the mass of the product equals the mass of the reactant. A reactant is the chemical reaction of two or more elements to make a new substance, and a product is the substance that is formed as the result of a chemical reaction (Video \(\PageIndex{1}\)). Matter and its corresponding mass may not be able to be created or destroyed, but can change forms to other substances like liquids, gases, and solids. Video \(\PageIndex{1}\): This is a nice little demonstration showing the Conservation of Mass in action. If you witness a 300 kg tree burn to the ground, there are only ashes left after the burn, and all of them together weigh 10 kg. It may make you wonder where the other 290 kg went. The missing 290 kg was released into the atmosphere as smoke, so the only thing left that you can see is the 10 kg of ash. If you know the law of conservation of mass, then you know that the other 290 kg has to go somewhere, because it has to equal the mass of the tree before it burnt down. Example \(\PageIndex{1}\) If heating 10.0 grams of calcium carbonate (CaCO3) produces 4.4 g of carbon dioxide (CO2) and 5.6 g of calcium oxide (CaO), show that these observations are in agreement with the law of conservation of mass. Solution \[\begin{align*} \text{Mass of the reactants} &= \text{Mass of the products} \\[4pt] 10.0\, \text{g of } \ce{CaCO3} &= 4.4 \,\text{g of }\ce{CO2} + 5.6\, \text{g of } \ce{ CaO} \\[4pt] 10.0\,\text{g of reactant} &= 10.0\, \text{g of products} \end{align*}\] Because the mass of the reactant is equal to the mass of the products, the observations are in agreement with the law of conservation of mass. Exercise \(\PageIndex{1}\) Potassium hydroxide (\(\ce{KOH}\)) readily reacts with carbon dioxide (\(\ce{CO2}\)) to produce potassium carbonate (\(\ce{K2CO3}\)) and water (\(\ce{H2O}\)). How many grams of potassium carbonate are produced if 224.4 g of \(\ce{KOH}\) reacts with 88.0 g of \(\ce{CO2}\)? The reaction also produces 36.0 g of water. Answer 276.4 g of potassium carbonate The Law is also applicable to both chemical and physical changes. For example, if you have an ice cube that melts into a liquid and you heat that liquid up, it becomes a gas. It will appear to have disappeared, but is still there. Summary Burning and other changes in matter do not destroy matter. The mass of matter is always the same before and after the changes occur. The law of conservation of mass states that matter cannot be created or destroyed. This page was constructed from content via the following contributor(s) and edited (topically or extensively) by the LibreTexts development team to meet platform style, presentation, and quality: Define the law of conservation of mass The law of conservation of mass states that mass in an isolated system is neither created nor destroyed by chemical reactions or physical transformations. According to the law of conservation of mass, the mass of the products in a chemical reaction must equal the mass of the reactants. The law of conservation of mass is useful for a number of calculations and can be used to solve for unknown masses, such the amount of gas consumed or produced during a reaction. The ancient Greeks first proposed the idea that the total amount of matter in the universe is constant. However, Antoine Lavoisier described the law of conservation of mass (or the principle of mass/matter conservation) as a fundamental principle of physics in 1789. Antoine LavoisierA portrait of Antoine Lavoisier, the scientist credited with the discovery of the law of conservation of mass. This law states that, despite chemical reactions or physical transformations, mass is conserved — that is, it cannot be created or destroyed — within an isolated system. In other words, in a chemical reaction, the mass of the products will always be equal to the mass of the reactants. The Law of Conservation of Mass-Energy This law was later amended by Einstein in the law of conservation of mass-energy, which describes the fact that the total mass and energy in a system remain constant. This amendment incorporates the fact that mass and energy can be converted from one to another. However, the law of conservation of mass remains a useful concept in chemistry, since the energy produced or consumed in a typical chemical reaction accounts for a minute amount of mass. We can therefore visualize chemical reactions as the rearrangement of atoms and bonds, while the number of atoms involved in a reaction remains unchanged. This assumption allows us to represent a chemical reaction as a balanced equation, in which the number of moles of any element involved is the same on both sides of the equation. An additional useful application of this law is the determination of the masses of gaseous reactants and products. If the sums of the solid or liquid reactants and products are known, any remaining mass can be assigned to gas. Conservation of Atoms – YouTubeThis video explains how atoms are conserved in a chemical reaction. An empirical formula of a substance is found using the masses and relative atomic masses of the elements it contains. The law of conservation of mass applies to closed and non-enclosed systems. This lesson includes 9 additional questions and 24 additional question variations for subscribers. 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All activities include instructions, activity cards, and a response/recording sheet if applicable. I've also included the DIGITAL and NO PREP version! Share with your class using Google Classroom™,All About Plants NGSS mini-bookby Teaching's a Hoot by Nicole JohnsonThis 30-page science mini-book was created to help teach the Next Generation Science Standards for 2nd grade in interdependent relationships in ecosystems.It covers the following principles: what plants are, what plants need, why plants are important,the parts of plants, how animals help plants throYou will receive 265 half-page warm ups, aligned and coded with the 6th Grade Common Core Standards! You can buy with confidence! These are best-sellers with over 200 positive ratings!Every standard is covered, with at least 5 warm ups per standard. 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