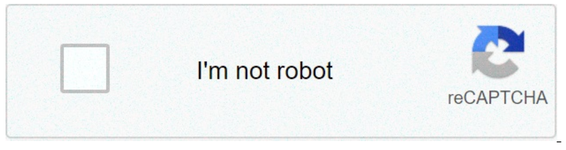

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Introduction to chemical reactions worksheet answer key pdf

Identify the symbols used to represent the states of matter in a chemical equation. In a chemical equation, the reactants are written on the left, and the products are written on the right. The coefficients next to the symbols of entities indicate the number of moles of a substance produced or used in the chemical reaction. The reactants and products are separated by an arrow, usually read aloud as “yields.” Chemical equations should contain information about the state properties of products and reactants, whether aqueous (dissolved in water — aq), solid (s), liquid (l), or gas (g). A chemical equation is the symbolic representation of a chemical reaction. The reactants (the starting substances) are written on the left, and the products (the substances found in the chemical reaction) are written on the right. The coefficients next to the symbols of entities indicate the number of moles of a substance produced or used in the chemical reaction. Notation for a Chemical Equation A chemical equation consists of the chemical formulas of the reactants (on the left) and the products (on the right). The two are separated by an arrow symbol (“→” usually read aloud as “yields”). Each individual substance’s chemical formula is separated from others by a plus sign. The state of matter of each compound or molecule is indicated in subscript next to the compound by an abbreviation in parentheses. For example, a compound in the gas state would be indicated by (g), solid (s), liquid (l), and aqueous (aq). Aqueous means dissolved in water; it is a common state of matter for acids, bases, and dissolved ionic compounds. As an example, the formula for the burning of methane can be written as follows: [latex]CH_{4\:(g)} + 2\:O_{2\:(g)} \rightarrow CO_{2\:(g)} + 2\:H_{2}O_{(g)}[/latex] This equation would be read as “CH four plus two O two yields CO two and two H two O.” For equations involving complex chemicals, read the chemical formulas using IUPAC nomenclature, rather than reading the letter and its subscript. Using IUPAC nomenclature, this equation would be read as “methane plus oxygen yields carbon dioxide and water.” This equation indicates that oxygen and CH4 react to form H2O and CO2. It also indicates that two oxygen molecules are required for every methane molecule, and that the reaction will form two water molecules and one carbon dioxide molecule for every methane and two oxygen molecules that react. The equation also identifies that all the compounds are in the gaseous state. The stoichiometric coefficients (the numbers in front of the chemical formulas) result from the law of conservation of mass and the law of conservation of charge (see the “Balancing Chemical Equations” section for more information). Also, please note that, as in the mathematical commutative property of addition, chemical equations are commutative. Reactants and products can be written in any order, provided they are on the appropriate side of the reaction arrow. Common Symbols Symbols are used to differentiate among different types of reactions. Sometimes, different arrows are used to indicate something about the reaction. For example: [latex]\rightarrow[/latex] indicates where the forward reaction is favored: in other words, more of the product is being produced. [latex]\leftarrow [/latex] indicates where the reverse reaction is favored: in other words, more of the reactant is being produced. [latex]\leftrightharpoons[/latex] or [latex]\leftrightarrow [/latex] is used to denote a system in equilibrium. If the reaction requires energy, it is often indicated above the arrow. A capital Greek letter delta (Δ) is written on top of the reaction arrow to show that energy in the form of heat is added to the reaction; hv is written if the energy is added in the form of light. When a baking soda volcano is made by mixing vinegar (dilute aqueous acetic acid) and baking soda (sodium bicarbonate), the resulting evolution of gas occurs via the following reaction: [latex]HCH_3CO_{2(aq)} + NaHCO_{3(s)} \rightarrow CH_3CO_2Na_{(aq)} + H_2O_{(l)} + CO_{2(g)}[/latex] Identify the symbols used to represent the states of matter in a chemical equation. In a chemical equation, the reactants are written on the left, and the products are written on the right. The coefficients next to the symbols of entities indicate the number of moles of a substance produced or used in the chemical reaction. 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