

mixed gas, consisting of two gases, oxygen and hydrogen. This gas is not condensable at any ordinary temperature. Unlike steam, it burns and even explodes. What kind of separation is this? What has been separated?

Blackboard crayons are prepared by subjecting the dust of plaster of Paris to great pressure, which causes the particles to unite and form the crayon. What kind of change is this? What kind of union? In the experiment (page 5) with the ammonia and hydrochloric-acid gases, the two gases disappear, and a solid is left in their place. What kind of change is this: chemical or physical? Is it union or separation?

§ 10. Annihilation and creation of matter impossible.

— **Experiment 1.** Prepare a saturated solution of calcium chloride. Mix with an equal bulk of water and weigh the solution. Prepare a dilute solution of sulphuric acid (1 to 4), and pour an equal weight of the last solution on the first, all at once, and shake gently. Instantly the mixed liquid becomes a solid. The solid formed is commonly called plaster of Paris. It is an entirely different substance from either of the two liquids used. What kind of change is this? A new substance has been formed. Has matter been created? Weigh the resulting solid; compare its weight with the sum of the weights of the two liquids. What do you find? What conclusion do you draw?

Solids may be converted into liquids or gases; gases may be converted into liquids or solids; substances may completely lose their characteristics: but *man has not discovered the means by which a single molecule of matter can be created out of nothing, or by which a single molecule of matter can be reduced to nothing.* Matter cannot be created, cannot be annihilated; it is a constant quantity. The discovery of this fact laid the foundation of the science of Chemistry.

This statement may not seem to accord with many occurrences of every-day experience. Wood, coal, and other substances burn; matter disappears, and very little is left that can be seen. But does matter pass out of existence when it disappears in burning, or does it assume the invisible state known by the name of gas?

Experiment 2. Hold a cold, dry tumbler over a candle-flame. The bright glass instantly becomes dimmed; and, on close examination, you find the glass bedewed with flue drops of a liquid. This liquid is water.