

from compressed atmospheric air to ignite Dutch tinder. Liquids as well as gaseous matter will by increase of their specific gravity also give out sensible caloric, as is witnessed by the admixture of about four measures of distilled water with one of concentrated sulphuric acid, when the compound will, in a few seconds, exceed the temperature of boiling water. The very familiar experiment of slacking concrete caustic lime by the application of water, and the caloric thereby evolved, is the necessary consequence of the water assuming the solid state. Solids also, as well as liquids and gaseous matter, are governed by the same law, for an expert smith will, by a few blows of a hammer upon a malleable piece of wrought iron, elicit sufficient sensible caloric to make it red hot, so as to explode gunpowder therewith. The caloric evolved is exclusively the result of the metal's increase of specific gravity by striking the iron at right angles, by which operation the cohesion of the atoms of metal are so destroyed by separation as to require welding before the experiment can be successfully repeated; not that the fractured iron receives a new supply of sensible caloric in a latent state by being heated in the fire, as has been asserted, but by reason of the shattered particles of metal being rendered in a fit state to receive the blows of the hammer without flying to pieces, which would be the case, but for the fact of the fractured metal being again united by the process of welding. Each atom of metal actually contains sufficient caloric in a latent state (when liberated by percussion or any other mode of concentrating the particles of metal) to destroy the metal's identity by converting it into a perfect oxide as is witnessed by the combustion of the particles of iron or steel abraded by the flint, in the act of striking a light, as it is termed. The late Mr. Wedgwood, to his astonishment, elicited caloric by the friction of two incombustible substances, viz., glass and stone; but he seems to have had no idea that this phenomenon was the result of compression or increase of specific gravity by the friction and abrasion of the matter thus acted upon. Of the latter case, we have the most striking proof in the following experiment, viz., that a cast iron bomb, when filled with water and subjected to an intense frigorific operation, does not assume the solid state (ice) till the cast iron shell is ruptured by the combined efforts of the metal contracting, and the water (in the aggregate) expanding, thereby overcoming the cohesion of the metal, when the shell bursts, and the water instantly becomes solid; at that instant caloric is evolved; and to show the beautiful harmonious working of nature in the chain of cause and effect, no evolution of caloric takes place till the water is frozen, thereby showing that a concentration of matter has taken place. The fact of water, in a concrete form, floating on water of the same temperature, is cited by philosophers as one of the exceptions to the general law—namely, that caloric is evolved with a diminution instead of an increase of specific gravity founded on the abstract fact, that ice, (and I may add, saline solutions) at the instant of crystallizing swim instead of sink. The cause of which phenomena should be sought for in the innumerable cells or spaces charged with air; or, in the buoyancy of those cells or air vessels in the aggregate more than compensating for the increase of specific gravity the water undergoes by congelation, thereby producing the paradox in question, viz., an evolution of caloric, and yet an apparent loss of specific gravity, judging from the abstract fact of the ice swimming upon water of the like temperature. We therefore learn the fact, that the water at the instant it assumes the solid form both contracts and expands; by the former, caloric is evolved, and by the latter, (not in each atom, but in the aggregate,) it floats upon water of its own temperature, not because the ice is specifically lighter than the water, but by reason of air cells or vacuities before referred to.