

the difference between that which is evolved when methane is burned in oxygen, and that which is evolved when its constituent elements, carbon and hydrogen, are burned. In this case it is the difference between $(94,300 + 136,800) - 213,800 = 17,300$. In this case the carbon is imagined to be solid and in the form of graphite, and the hydrogen and oxygen to be gaseous; if the carbon were a gas, to begin with, it would naturally give out less heat on its combustion, because heat is necessarily absorbed in the conversion of solid into gaseous carbon.

It might be thought, without due consideration, that a measurement of the heat of formation of a compound involves a measurement of the energy which it contains; but this is not so, for it is obvious that what is measured is only the difference of the energy contained in the elements from which it is formed and in the compound which they produce. We are as yet ignorant of the total amount of energy contained in any element or compound.

It is possible by suitable appliances to obtain the energy evolved during chemical combination, not as heat, but in the form of an electric current. When two metals are immersed in a conducting liquid or electrolyte, they at once exhibit a difference of electric potential; or connecting by a wire the two portions of the metal which do not dip into the liquid, that metal which has the highest electric potential combines with one of the ions, and the electrolyte which has thereby discharged the other ion, as already explained on p. 36, travels through the electrolyte until it touches the metallic plate, when it, too, is discharged and escapes in the free state; its charge enters the metallic plate. The result of this action is that the chemical combination of one of the metals with one of the ions of the liquid is attended by the formation of an electric current, and not necessarily by an evolution or absorption of heat. Now it is possible to measure the difference of potential between the two metals and the amount of electricity which passes through the wire, and thus to determine the amount