From this equation it follows that two volumes of chlorine monoxide yield two volumes of chlorine and one of oxygen, measured under the same conditions of temperature and pressure; that is, two volumes become three volumes, temperature and pressure remaining constant. But temperature does not remain constant. The decomposition of chlorine monoxide is attended by a disengagement of heat, and the heat so evolved is sufficient to raise the products of decomposition (supposing their specific heat to remain constant) from 0° to 1709° C. At this temperature 3 volumes of gas will become 22 volumes. This is therefore the space which two volumes of the original compound would occupy if it were free to expand. Hence 1 volume would become 11 volumes, or the gases produced by the decomposition would occupy 11 times the original volume of the compound. If now the reaction takes place in a closed space which prevents the gas from expanding at all, then the pressure increases in proportion to the volume the gas would occupy if free. So that in this case the pressure will be 11 atmospheres.

Let us now consider the first case. The reaction

$$2\,H_2+O_2=2\,H_2O$$

is exactly the reverse of the one we have just been considering, and in it 3 volumes become 2 volumes—*i.e*, if the temperature remained constant and the steam remained uncondensed, there would be a diminution in volume instead of an increase. But the temperature does not remain constant. In this reaction also heat is evolved and the quantity of heat is enough to raise the steam nearly 9,000° C. (if its specific heat remained the same). At this temperature 2 volumes would become 66. Hence the original 3 volumes would become 66, and 1 volume 22 volumes. That is, if the reaction took place in a closed space the pressure would be 22 atmospheres, or just double the former.

The importance of the part played by the heat disengaged in an explosive reaction is well brought out by these two examples.

To the first of the two classes that we have been considering belongs gunpowder. To the second nitro-glycerine.

It has been shown by the analyses of Bunsen, Karolyi and Abel and Noble, that the reactions which occur when gunpowder is fired vary with the composition of the powder and the conditions of the experiment, and that the equation representing the explosion of military or sporting powder is a very complex one. In the case of blasting powder, however,