There are two ideas contained in this definition.

1st. An increase in volume due to chemical reaction.

2nd. The increase is sudden. The force of an explosion is measured not in foot pounds merely, but in foot pounds per second.

To illustrate, consider an analogous case. A cubic foot of water will yield about 1,700 cubic feet of steam. If this change takes place slowly as in a steam boiler under ordinary conditions, the expansion can be made to work, which can be regulated at pleasure—to grind flour, for instance.

If the change takes place instantaneously the boiler is shattered. This is an explosion, although water is not an explosive according to our definition; for the steam is formed from the water, not by a chemical action, but by a physical change merely.

Now, one explosive differs from another not only as to the nature of the chemical action which brings about the explosion, but also as to the rate at which this change takes place; and in studying the effects of a given explosive we have to attend to two things:—(1) The volume of gas which a given volume of the explosive yields; and (2) the rate at which this gas is developed.

Thirty years ago there was practically only one explosive—gunpowder (though many explosive substances were known). Today we have a fresh one patented every week, and it appears to be worth while considering to what causes the differences in the properties and efficiency of these bodies is due, and how far a knowledge of their chemical constitution can throw light on their behaviour, and upon their suitability for different purposes.

There are two kinds of explosives:

1. Mixtures of two or more bodies which can be made to combine together, forming compounds which, under the conditions of the experiment, occupy a greater volume than the mixture.

2. Compounds which can be decomposed, yielding products which occupy more space than the compound.

As an example of the first class we will take a mixture of oxygen and hydrogen. As an example of the second class we will take chlorine monoxide, Cl_2O. Let us consider the second case first.

The equation representing the reaction is:

$$2\,Cl_2O = 2\,Cl_2 + O_2.$$