

When wood or other fuel is burned, it disappears more or less completely, nothing, or only a little ash, being left behind. It seems from this that burning consists in the breaking up of the burning substance, part or all of it disappearing.

EXPERIMENT.—Place a candle on one pan of a balance and carefully balance it by means of weights, shot, or sand on the other pan. Light the candle and allow it to burn for some time. It will be noticed that the pan holding the candle gradually rises, indicating loss in weight.

But let us examine some other cases of things altered by fire before making a final decision as to the true nature of this combustion.

Some of you have seen a blacksmith at work, and have noticed that after he has heated his iron very hot in the fire, some scaly material breaks off when he hammers it. If this “hammer scale” be carefully collected and put with the rest of the iron, it will be found that the whole weighs more than the original iron did. The same sort of thing happens when other metals are burned.

EXPERIMENT.—Place a metal plate or saucer on one pan of a balance (separating it from the pan by three or four little pieces of brick or stone, so that it will not injure the pan when it becomes hot); place on it about a tablespoonful of powdered magnesium metal in a conical pile, and balance it as was done in a previous experiment. Light the magnesium by means of a match or burner-flame.

EXPERIMENT.—Metallic lead or metallic tin may be highly heated for some time in a porcelain crucible. If the crucible and contents be weighed before heating and again after heating and cooling, gain in weight will be shown.

Between the years 1650 and 1710 the phenomena of combustion were explained by supposing that all combustible substances were made up of a peculiar something, a principle of combustibility, called phlogiston, combined with the ash, if any; and on burning, this phlogiston was supposed to escape. Hence the ash would be smaller than the original fuel:

Fuel = phlogiston + ash.

The same sort of explanation was employed in connection with the calcination of metals:

Metal = phlogiston + calx,

until it was observed that the calx was heavier than the original metal. The theory then became untenable.