

The ELEMENTS OF CHEMISTRY

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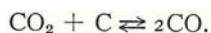
Carbon dioxide is called *carbonic anhydride*. Carbonic acid has never been obtained in the free state, being known only in solution. It is one of the feeblest of acids. With each metal it forms two salts - an acid salt and a normal (neutral) salt. Thus we have sodium acid carbonate, NaHCO_3 (baking soda), and sodium carbonate (washing soda), $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$; also calcium bicarbonate, $\text{Ca}(\text{HCO}_3)_2$, and calcium carbonate, CaCO_3 :

- (1) $\text{Ca}(\text{OH})_2 + \text{H}_2\text{CO}_3 + \text{CaCO}_3 \sim + 2\text{H}_2\text{O}$,
 (2) $\text{CaCO}_3 + \text{H}_2\text{CO}_3 \rightarrow \text{Ca}(\text{HCO}_3)_2$ (soluble in water).

An excess of carbonic acid favors the formation of the acid salt.

Carbon Monoxide, CO

167. Formation.-Carbon monoxide is formed when carbon burns in a limited supply of oxygen, or by passing CO_2 over hot charcoal or coke:



This explains the formation of CO in an ordinary grate fire, where reduction takes place in the interior of the grate as the CO_2 passes

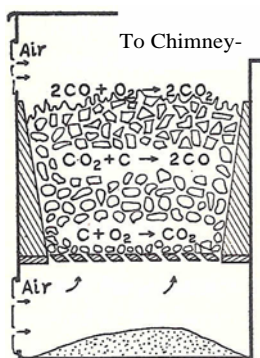
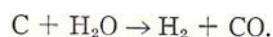


FIG. 67. Section of Kitchen Range Showing the Formation of Carbon Monoxide.

over the heated carbon. CO, on coming in contact with air at the top of the grate, burns with a blue flame to form CO_2 . Carbon monoxide is formed in ranges and furnaces during incomplete combustion and it may escape into a room in case of insufficient draft (Fig. 67). The gas also is formed in the combustion engine.

Producer gas (approximately 39 per cent of CO and 60 per cent of N_2) is made when air is passed over heated coke.

Water gas is produced on a large scale by passing steam over heated coke or anthracite coal:



- water gas

Water gas and producer gas are excellent fuels.

168. Laboratory Preparation.-Carbon monoxide can be prepared conveniently for laboratory use by treating either formic acid.