

Agriculture.

First LESSONS IN SCIENTIFIC AGRICULTURE
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CHAPTER V.

Compounds of Carbon.—Carbon dioxide, a compound of carbon and oxygen, is the proportion of 8 of carbon to 16 of oxygen. Carbonic acid is a gas, a little more than one-half heavier than common air; it readily suffocates animals which are obliged to inhale it, and it extinguishes flames. Like the other substances known to chemists as acids, it reddens vegetable blue colors, has a sour taste, and is capable of combining with earths such as lime, and with alkalies such as potash and soda.

Two of the modes in which carbonic acid is produced in the atmosphere are by the action of organic matter, and by the decomposition of carbonate of lime. It is formed in many other ways. It exists in large quantities in limestone and other rocks, and is given out by volcanoes, and brought to the surface by springs; it is also sometimes disengaged from ferrous, &c., in mines, and accumulates in deep cellars, wells, &c., forming the "choke damp," which occasionally proves fatal to persons incautiously entering such places. When wood, straw, &c. (which are exposed to air and moisture) undergo a kind of slow combustion, which we call decay, carbonic acid is given out, and combines with the oxygen of the air, and forms carbonic acid and water, and at length, remains but a coldly saturated vapor of little further change.

In consequence of these processes, it is evident that carbonic acid is continually produced and carried upwards, and it is thus prevented from accumulating to any great quantity, and is thus kept from suffocating life. It is found that the quantity of carbonic acid in the air does not exceed one-hundredth part of its weight, and is not, in fact, in any way, increased by the action of organic matter, and consequently that rain and surface water are always impregnated with it, and it is found by experiment that plants exposed to the air and water containing this gas, grow more luxuriantly than those which are not so impregnated. It is thus apparent that the carbonic acid produced by burning, breathing, and other processes, which would otherwise be lost to the atmosphere, is employed as the food of plants, and it is thus by the wise arrangement of a beneficent Providence, made a source of supplying the most valuable substances which the earth affords to man.

Light Carbonated Hydrogen.—As its name imports, it is composed of carbon and hydrogen, and is one of several hundred kinds of hydrocarbon gases. It is a colorless gas, less than one-half as heavy as common air; it is incapable of supporting respiration or combustion, but, when oxygen is applied to it, burns with a yellowish light. It is formed by the action of steam on iron, and is also formed from the decomposition of organic matter. It is a gas of considerable density, and is given off from swamps and stagnant pools. It is generally from all places where vegetable matter is decaying in fresh water. When organic matters become putrid in marshes (Gulliver and Epion Salts) always present in such water, and sulphuretted hydrogen is produced; this gas is also one of the offensive smell of the mud of creeks and estuaries.

Both of these substances may assist in nourishing the rank vegetation of swamps, but by the small quantity which they exist in the air, or in the soil, of cultivated fields, their influence on crops must be but trifling. It is a gas of considerable density, and is given off from swamps and stagnant pools.

Compounds of Nitrogen.—The substances which we have hitherto noticed can furnish no nitrogen to plants; this they in great part derive from the common air to be considered. Ammonia is a compound of nitrogen and hydrogen. Though composed of two gases destitute of taste and smell, and itself a gaseous substance, it has a burning taste and a blue color. With oxygen it combines by water to the amount of 670 times its own bulk; which when dissolved in water, it constitutes the common spirit of saltpetre, which is still a common spirit of saltpetre, which is still a common spirit of saltpetre.

It is produced in the decay of animal and of many vegetable substances. The strong smell of stables and of urine, and other animal matters in a putrid state, is principally owing to the escape of ammonia; hence the waste of ammonia is a great loss to the farmer. It is also found in the atmosphere, and is a constituent of the air. It is a gas of considerable density, and is given off from swamps and stagnant pools.

It is very soluble in water. The ammonia which the careless farmer allows to escape from his stables and dung-houses is not lost, but only added to the general stock of nutrients for vegetation. Every shower which falls on the soil, and every drop of rain water, carries down to the roots of plants, the ammonia produced by the decay of nature which may be buried in it.

It can easily be decomposed, and also separated from other substances when combined with them. From the fact that it cannot be decomposed, that it may if necessary, when introduced into the cells of plants, by which it is converted into its constituent elements, and those applied to purposes of nourishment. And of the latter, the readiness with which its compounds undergo changes when exposed to the action of other bodies, furnishes conclusive evidence. When, for instance, lime is added to a solution of ammonia, a strong smell of ammonia is instantly emitted, and hence the inferior effect of lime when applied to such substances. When lime is buried in the soil, however, this decomposing power may serve to set free ammonia, in circumstances favorable to its being absorbed by plants.

position takes place; or the carbonic acid and sulphuric acid change places, and sulphate of ammonia and carbonate of lime are produced, so that
Carbonate of Ammonia } Sulphate of Ammonia
and } are changed into }
Sulphate of Lime } Carbonate of Lime.
Now, carbonate of ammonia, as before stated, evaporates rapidly when exposed to the air; whereas the sulphate of ammonia is not thus volatile; and the circumstance of a volatile salt of ammonia being thus changed by the agency of gypsum into one that is fixed, is of great assistance to the farmer. Thus, when gypsum is spread on the floor of a stable, the carbonic acid of ammonia—which is formed in such places—instead of being permitted to escape into the air, becomes converted into the sulphate, and remains united with the gypsum; every pound of gypsum thus saturated with ammonia, is able to supply all the nitrogen required by twelve pounds of wheat. Of all the manures produced by a stable, lime is undoubtedly the most valuable; it is a great part of its utility depending upon the quantity of nitrogen which it contains; and it is allowed to dry up close, much of this escapes as carbonate of ammonia; this loss also may be prevented by gypsum, a part of the influence of gypsum, when spread upon the floor, being to seal the soil not only from the air, but from the escape of the ammonia which may rise from the ground, but attracts it from the air, and adds from the very same cause, that blow over the soil, it gathers valuable nourishment for the growing crops.

Ammonia is largely absorbed by various substances. Powdered charcoal absorbs it freely, and its bulk of ammonia, and decays in about twenty-two days; hence these substances, when plentifully contained in soil, are capable of collecting and retaining for the use of plants an abundant store of nitrogen. In a manner somewhat similar, burned clay, coal ashes, and the red oxide of iron (red ochre), absorb ammonia from the air. The effects of burned clay is a manure, and the fertility of those light red soils which are colored by oxide of iron, we partly to be ascribed to this cause.

Chlorine of Lime is recommended in a sprinkled solution, or in a "fly water," for the protection of trees and other plants; it is useful, on both of vegetables, around the trunks of fruit trees, &c. Even rats and mice quit places where chloride of lime has been sprinkled.

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