

naturally fertile soil, and capable of sustaining for a lengthened period a succession of valuable agricultural crops, is found to be, on examination, a very compound substance. For instance, we shall give the analysis of a soil and subsoil as an example,—

	SOIL.		SUBSOIL
Potash .....	2.8001	—	2.1761
Soda .....	1.4392	—	1.0450
Lime .....	0.8300	—	1.2756
Magnesia .....	1.0200	—	1.3958
Peroxyde of Iron .....	4.8700	—	6.2303
Sulphuric Acid .....	0.0911	—	0.0396
Phosphoric Acid .....	0.2400	—	0.2680
Carbonic Acid .....	0.0590	—	—
Chlorine .....	0.0038	—	—
Alumina .....	14.0400	—	14.2470
Silica .....	63.1954	—	61.6358
Organic Matter .....	8.5503	—	6.8270
Water .....	2.7900	—	4.5750
	<u>99.8364</u>		<u>99.7032</u>

Here the soil contains more potash and soda than the subsoil, which has no doubt derived its surplusage of these components from the ingredients employed as manure. No additions of lime or magnesia were ever known to have been made to the soil. The silica and organic matter would, no doubt, be increased by cultivation; and from the same cause, the peroxide of iron would be proportionably abstracted. The subsoil contains more water than the soil, which is more exposed to evaporation.

Here we have thirteen appreciable constituents; and though an idea is becoming very prevalent with many learned men, that, upon an ultimate analysis, the simple substances in nature will be found very few in number,—and that the one may be found passing into the other, and to a large extent convertible—yet this is one of her secrets which is still debateable, and its truth remains to be ascertained by the patient industry of the adventurous chemist.

*Alkaline metals.* We find contained in the above analysis four alkaline metals, viz., 1. potash, 2. soda, 3. lime, and 4. magnesia.

1.—*Potassa* is a white crystalline solid, and is only obtained in a state of purity by burning the metal in oxygen gas, or in air; but for ordinary purposes it is procured from wood ashes, which contain the potassa in combination with carbonic acid, which last being separated, the potassa is left pure,—with exception of containing 1 atom of water, which cannot be removed short of reducing the potassium to a metallic state. The article therefore, as thus obtained, is properly called a *hydrate of potassa*. When exposed to the air, it absorbs water from it and becomes liquid: this property is called deliquescence.

2.—*Soda*. This is a greyish white solid, and is formed when the metal is burnt in oxygen or in air; it is also formed when the metal is thrown on water, by uniting with its oxygen; but in whatever way procured, except by uniting the metal with dry oxygen, it retains a portion of water which cannot be separated by any means hitherto employed. It is therefore called *hydrate of soda*.

3.—*Lime* is composed of 1 atom of calcium, to 1 of oxygen. It is a greyish white, and is familiarly called quicklime. It is generally in nature, found com-