

This latter compound is very soluble and is produced in this way. In chemistry we have what are called weak and strong acids. When a weak acid is united to a base, a stronger acid will expel it and seize on the base itself. We have a familiar example of this in the mixing of soda powders where tartaric acid is mixed with carbonate of soda; here the tartaric acid being the stronger expels the carbonic acid and unites to the soda—the carbonic acid causing effervescence as it escapes. When sulphuric acid is added to bones it drives a part of the phosphoric acid from their lime and unites to it, forming sulphate of lime, (gypsum, or plaster of Paris.) The phosphoric acid thus set free does not escape, as would carbonic acid, but either unites to a smaller proportion of lime, or is left alone in solution, according to the quantity of sulphuric acid employed. To convert 100 parts of pure phosphate of lime into the biphosphate, 45 parts of absolute or pure sulphuric acid must be added; we then shall have about 68 parts of biphosphate of lime and 77 parts of sulphate of lime or gypsum, and we have in the mixture biphosphate and sulphate of lime mixed mechanically together.

When this compound is added to the soil from its extreme solubility it is carried to every part of it, and there meeting with lime or other bases it is reconverted in the neutral phosphate again, or if it meets with potash or soda into the phosphate of these bases. So, although it may eventually be restored to the same compound, nevertheless a most important and vital point has been gained. When dissolved, it has entered into every pore in the soil, has come in contact with every grain of sand, has become most intimately blended with the earth to be cultivated; so that from its minute subdivision, every point in the soil can furnish to the plant this material for its support; for other things being equal, the solubility of bodies is in proportion to the fineness of their divisions, and all manures must be dissolved before they can act on vegetation. It becomes then a matter of great interest to the consumer to have his bone dust not only dissolved, but to have it treated afterwards with such substances as will not reproduce the original compound—if lime be employed, this will take place, and though we may have the bones reduced to a very fine state of division, yet we have to rely on mechanical means to mix them with the soil instead of the more thorough and complete mixture which takes place when they are applied in a soluble state, and thus reach every atom of the soil. This is a point of the highest importance and should always be *strictly* attended to.

Since sulphuric acid is that which is most usually employed to dissolve bones, it is necessary that something should be said in relation to it. In commerce it exists in two forms: brown or chamber acid is that which issues from the leaden chambers where it is made, and oil of vitriol is that which is produced when this