



In Table III, and Table IV, the per cent. of evaporation in 2 days is again given, and diagrams are plotted showing the relation between the tensile strength and the weight of the dried briquettes in the pressure tests, and also other diagrams showing the product of tensile strength and evaporation plotted on a base of weights of briquettes.

The X marks in the diagrams show the positions of tests made with 20 lbs. pressure and 20 p. e. of water, and they are seen to stand at prominent and usually maximum points on the diagrams, proving that this is the best point to select of all the tests made.

It will be seen in these diagrams as in those of crushing tests, that in 1 to 1 mixtures the variation of evaporation and strength combined is not very great, but not so close as in the former tests.

The 3 to 1 tests are very erratic, as might have been expected with different per cents. of water and different amounts of pressure. It is evident that each cement has distinctive qualities of its own, because with the same weight of briquette the strengths vary, and this brings up the important point that in sand tests the strength ought to be referred to some basis of weight of briquette, because a slight variation in weight seems, from Table IV, to affect the strength very much. It would not take much evidence to determine the average weight, and all tests could be reduced to this by multiplying by $(\frac{27}{\text{weight}})^2$ which would change the section density to a standard.

SERIES VI.

SUGAR TESTS.

Sucrate of lime is soluble in water, and it was chiefly a matter of interest to see the effect of sugar on cements in weakening them, because it has been asserted by several writers that the reverse is the case; one investigator several years ago showed by tests that from $\frac{1}{2}$ to 1 p. e. of sugar would in 4 to 6 months give a gain in strength.

Sugar, in these tests, 2 p. e. of the amount of cement (by weight), was used, and the diagrams attached sufficiently indicate the results. In the Portland cement the strength ranges closely at 50 p. e. of the ordinary strength as far as 6 months, while with the natural cements, the sugar effect was overpowering. After one week's immersion the briquettes showed signs of cracking, and as time went on became completely checked, and expanded so much as to give practically no tests. This is further evidenced (see exhibit of briquettes) by the upper surface, which was protected by a coating of iron deposited from Montreal water, being intact, while the checking was greatest on the bottom where the water had free access.

The lime mixtures, kept in open air, showed encouraging results for 2 months, and seemed to prove that the use of sugar, in lime, as practised in India, was beneficial; but the 3, 4 and 6 months' tests disprove it. Altogether, it seems evident that this much or more sugar would be damaging in its effects on any kind of mortar in any situation, and it is extremely doubtful whether any sugar whatever would have other than a weakening effect.

