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PROCESS FOR MAKING AN EMULSION FOR MORTAR TEMPERING

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This invention relates to a process for the production of an emulsion for the purpose of tightening mortar. The invention has for its object to attain the known very good tightening effect of the lime soap formed in the mortar itself with the free lime in such a manner that the formation of the lime soap takes place in the finest possible distributed foam and so that thereby on the one hand a greatest possible protecting effect is obtained and on the other hand at the same time scum formation is practically absolutely prevented. This problem is solved according to the invention in that highly molecular fatty acids, or a mixture of the same, are emulsified in alkaline solution with saponifiable fats or oils with simultaneous employment of non-saponifiable oils and fatty substances in the presence of emulsifiers and preserving colloids, such as vegetable mucilages and vegetable gum, polymeric carbohydrates, albuminoid substances or degradation products of the same and sulfite spent liquor.

Herefrom results therefore that the tightening effect of the emulsion in reaction with the mortar is effected by the formation of lime-soaps in finest distribution, and that at the same time any formation of scum film which loosens the mortar structure and reduces the coherency is avoided. This is attained, according to the invention, in that:

1. A combined emulsifier and preserving colloid effect of an obviously chemically reacting mixture of sulfite spent liquor and albuminoid substances is employed, and

2. Not the highly molecular fatty acids alone but in mixture with non-saponifiable oils and fatty substances are employed.

It has not been known up to the present that the formation of most finely distributed lime-soaps in the mortar becomes possible thereby that highly dispersive fatty acids, which normally react with glue-water spontaneously with formation of coarse flakes, are introduced with the aid of such emulsifiers and preserving colloids. This is possible only by the property belonging to the emulsion, to contain free fatty acids besides alkali hydroxide without producing the typical alkali soap reactions. Evidently there is present in this instance a suspension colloid and not, as in the case of soaps, an emulsion colloid. During strong shaking no scum formation can be observed in the dilution 1:20 with water, in opposition to true soap solution of similar concentration, the scum bubbles which have formed decomposing instantaneously on standing, this being not the case with the soap solution. Further, the viscosity of the emulsion is very little compared with that of the soap solution, the values corresponding comparatively approximately to a 10% as compared with a 100% glycerine solution. For illustrating the highly dispersed lime-soap formation a comparison test may be cited as follows:

Every 5 grams of potash soap (8% oleatic acid) and 5 grams of the new emulsion (8% oleatic acid) have been dissolved filled up to 100 cubic centimetres with water. After addition of 10 grams of Portland cement every mixture has been strongly shaken 20 times in measuring cylinders and after standing during 15 minutes the sediment which had formed was read. This amounted for the soap solution to 40 cubic centimetres of granular, flaky parts, a portion of the cement forming a stiff mass with the scum on the top. In the emulsion the sediment amounted to 14 cubic centimetres of very fine particles, the solution standing above contained a turbid milk of some cement with emulsion particles. The scum above the liquid was decomposed. A comparison test without addition yielded a sediment of 12 cubic centimetres.

Herefrom results necessarily that in spite of the presence of free fatty acids besides free alkali in the emulsion the stability of the emulsion cannot be attained by means of soaps, but that as emulsifiers and preserving colloids the combination of sulfite spent liquid with the albuminoid substances is responsible. As thorough experiments have shown, it is not possible, to produce a useful, stabil emulsion with one of the components alone so that this combination is of quite special importance.

According to the known processes it is desirable to either add finest possible distributed lime-soaps to the mortar or to make them originate therefrom. This is, however, a difficult task on account of the extraordinarily great reaction capability of the lime-soaps. If the lime-soaps are added to the mortar in completely formed state, the fatty substances are bound either on lime or on clay and slate and absorbed. The particle size of such suspensions, which are mostly pasty, must in no case be less than 10, whereas that of clear emulsions is far below this. The new emulsion therefore gives also, with any desired water dilution, clear or only weakly turbid stable solutions, whereas the suspensions form sediments rapidly. As the importance and preserving effect rapidly increase with the reduction of the particle size, this shows that a serious progress results from the invention.

That a fine dispersion is often desirable in

order to attain a more intensive effect, is generally known, however, the way leading to this aim proposed in the present process has nothing to do with the dispersion, for instance by a Planson colloid mill. At another place it is mentioned that the generally prejudicial, loosening effect of scumming colloid substances in the mortar (in this instance albumin degradation products) may be prevented by addition of little quantities of salts of higher fatty acids of sulfuration products from the same. Comparatively large quantities of albuminoid substance with a little addition of scum preventing media are in question. The mortar tightening is in such cases not effected by lime-soaps as in the new emulsion, but it is based upon the tightening effect of albuminoid substances, which represent easily moistenable substances dissolved in water in more or less molecularly dispersed form.

The present invention relates, however, to a true emulsion which, for preventing scum formation, contains not only unsaponifiable oils and fatty substances, but also the combined albumin-sulfit spent liquor emulsifier, and the tightening effect of which in the mortar is based chiefly on the formation of water-repellent lime-soaps. In this instance the matter is to prevent scum formation on another object and by other means, and it is generally known that this problem has to be solved in a different manner for any manufacturing.

The progress which is attained according to the invention is clearly shown by the following association:—

Addition	Weight of the mortar per unit of volume	Mortar condition
Without addition	2.01	Permeable.
Addition according to the invention.	2.01	Well water-tight.
Insoluble soaps without soluble soaps.	2.01	Somewhat permeable.
Insoluble soaps with alkali soaps.	1.95	Satisfactorily water-tight reduced coherency.
Pure alkali soaps with and without soluble additions.	1.80–1.90	Satisfactorily water-tight strongly reduced coherency.

This result is, as already above explained, attained in that the fatty acid is mixed with unsaponifiable oils and fats (reduction of formation of scum film) and incidentally emulsified with preserving colloids, such as albumen, in combination with sulfite spent liquor in alkaline solution. Tests have shown that albumen products, as regards scum prevention are not sufficiently effective, that on the other hand the sulfite spent liquor, which has a specially good scum reducing effect, if employed alone, did not give a good emulsification and also not complete avoiding of scum formation. Herefor an addition of unsaponifiable fatty substances was also necessary.

It has further been ascertained that a stable emulsion had to be obtained in which free fatty acids could exist at the side of free alkali without forming a soap, this being recognized already from the low viscosity of the emulsion. This could be attained thereby that albumin as well as sulfite spent liquor are employed simultaneously, and a mixture of these substances in a condition as free from water as possible, with the fatty acids and unsaponifiable oils was boiled in the presence of potash lye and then prepared with water to form a liquid emulsion. It seems that then the sulfite spent liquor chemically reacts with the albumin, probably in such a manner that gluco-proteides are formed. In any case the xanthoprotein reaction and also other albumin reactions no longer pass off distinctively positive. It would be very difficult to give here more detailed statements about the chemical process. Apparently the lignine sulphonic salt is especially effective in the sulfite spent liquor for preventing the scum formation, whereas the carbohydrates which are present effect the finer distribution of the tightening medium.

According to the invention such an emulsion can be prepared in that highly molecular fatty acids, saponifiable fats and oils in mixture with unsaponifiable oils and fatty substances, with employment of emulsifiers or preserving colloids, such as vegetable mucilages and vegetable gum, polymeric carbohydrates, albuminoid substances, sulfite spent liquor are treated in alkaline solution to form a stable emulsion. For example 5 parts fatty acid in mixture with 6 parts mineral oil are emulsified with 89 parts of an aqueous solution of albuminoid substances and sulfite spent liquor with addition of alkali hydroxide. Highly dispersed liquid emulsions can be obtained by employment of liquid fatty acids and liquid mineral oils together with potash lye or pasty emulsions can be produced with solid fatty acids, such as stearic acid and solid hydrocarbons, such as paraffine.

The emulsions produced in this manner dissolve in the water either clear or with feeble turbidity. Added to the mortar tempering water in a quantity of about 2 grams for 100 grams cement, these emulsions make it possible to attain excellent tightening effects without impairing of the mortar quality, this being due to the fact that the active substances can be distributed in the mortar in highly dispersed state and that the formation of water-repellent lime-soaps owing to the preserving effect of the emulsifiers takes place without formation of scum film and in such finely distributed form that the utmost preserving effect is ensured. Another advantage of these emulsions is that they possess a high wetting effect and reduce the amount of water necessary for the mixing of the mortar, this being very important relative to the coherency of the mortar. The mortars prepared with the emulsion possess further increased elasticity and greater coherency, this promoting a uniform mortar mixture and preventing formation of the apprehended water-pores in the mortar. Metallic salts can also be added to the emulsion for attaining special effects.

CARL LETTERS.