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PLASTIC COMPOSITION AND PROCESS FOR MANUFACTURING THE SAME

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The present invention has for object a new composition comprising several products acting as colloids under the influence of temperature and of pressure and the mutual affinity and solubility of which relatively to each other allow of obtaining at the same time a plastic material having new properties and given original characteristic features; the invention also relates to the process for manufacturing said plastic composition.

This new plastic, waterproof, fire-proof, dielectric composition can present characteristics of resistance and of hardness which differ according to the nature of the charges employed; it can also be directly metallized without previously scouring the surfaces to be treated, according to known processes.

The process allowing to carry out the invention consists:

(1) In incorporating with the solid charge dispersed in a liquid, several plastic compounds in the soluble state.

(2) Then in rendering the latter insoluble by double decomposition by means of a metal salt, for instance, an alumina or magnesia salt, or, preferably, a mixture of these two salts.

(3) After elimination of the residual liquid, the insoluble mass is dried in a stream of hot air, then pulverized and eventually mixed with coloured mineral pigments insoluble in the solvents subsequently used.

(4) The dry powder thus obtained is treated with a liquid constituted by a mixture of suitable solvents containing in solution therein a mixture of thermoplastic products the affinities of which (for instance their solubility relatively to each other, their melting point) allow them to combine with the insoluble plastic materials impregnating the solid charges mentioned in the first operation.

(5) The organic dye-stuffs eventually necessary, being dissolved in the solvent or solvents.

(6) The solvent or solvents are then eliminated by distillation.

The powder finally obtained presents original characteristic features, particularly physical and mechanical properties very different from those of the plastic constituents taken separately.

The moulding of this powder is effected at temperatures comprised between 125 and 180° C. at a pressure of 95 to 125 kilograms per square centimeter, the duration of the baking operation varying between 2 to 5 minutes according to the bulk of the article to be moulded.

The constituents of this plastic material are for instance:

I. A charge constituted: (*a*) by mineral products, preferably, by silicates of alumina and of magnesia in powder form, such as pulverized slate and asbestos fibre, and (*b*) by cellulose products such as cork powder.

II. Organic materials rich in animal proteins such as casein, or vegetable proteins such as peanut cakes, to which are added natural resin, naphthenic acids or a mixture of stearic and oleic acids.

These compounds being rendered soluble in the hot state in water to which soda has been added, are then precipitated by double decomposition, by means of a solution of an alumina or magnesia salt or of both these salts.

III. A mixture of two thermoplastic products such as:

(*a*) Glycerophthalic resin or cresylic resin either of which is modified by natural resin or chlorinated rubber.

(*b*) A resinate of glycerine (ester).

The products included in paragraphs II and III have mutual affinities and physical and chemical characteristics such that, under the action of heat and of pressure used for moulding, they act as colloids and give a new product having definite properties.

The following composition is given by way of example:

	Per cent
Cork powder	52
Asbestos fibre	3
Slate powder	8
Natural resin	5,3
Naphthenic acids	5
Caustic soda	0,7
Casein	12
Glycerine resinate	8
Glycerophthalic resin modified by natural resin	6
	100

The above composition can, of course, be modified according to the properties it is desired to obtain in the plastic products. For instance, for

sheets or plates which must have great resistance to penetration, the charge will be constituted by the powder of a wood of high density and the proportion of the thermoplastic products will be lowered relatively to that of the plastic products used for impregnating the solid charges.

On the contrary, for the moulding of articles having vertical walls of small thickness, it is advantageous to use a composition containing a slightly greater proportion of thermoplastic products in order to allow the heated plastic powder subjected to pressure to more rapidly penetrate all the cavities of the mould.

The process for the manufacture of this plastic composition being an object of the invention, the latter is briefly described hereinafter, by taking as a basis, by way of example, the above mentioned composition.

In a vat heated for instance by steam circulating in a double casing, are introduced the water, soda, natural resin, naphthenic acids and casein, then the mass is raised to a temperature approximating boiling point, the liquid being thoroughly stirred by a turbo-mixer, the mineral and cellulose charges are added; when the latter are well impregnated and maintained in suspension in the liquid, a boiling solution of sulphate of alumina and of magnesia is gradually poured in, until complete double decomposition; the residual liquid being eliminated, the charges impregnated with insoluble products are washed, then the divided mass is subjected to a stream of hot air until complete dehydration.

The dry product to which has been eventually added the coloured mineral pigments, is crushed into a powder, then treated with the solution of the solvents containing in solution therein the thermoplastic products and, eevntually, the dissolved organic dye-stuff.

The solvent being eliminated by distillation in a closed vessel, the plastic powder is ready to be used for the moulding of articles by heating under pressure as previously indicated.

It has been stated above that use can be made of organic materials rich in animal proteins or vegetable proteins; the composition previously indicated utilised animal proteins such as casein, which necessitated the use of various other constituents; the use of vegetable proteins allows of simplifying the manufacture and of utilising a smaller number of constituents: as vegetable proteins use is made of pea-nut cakes or rice flour, or a mixture of both.

These products rich in proteins have remarkable plastic properties and intimately combine, even in small proportions, with synthetic resins mixed with a high proportion of charges such as cellulose waste, they are capable of being moulded in the hot state and under low pressures in order to give moulded articles having interesting characteristic features as well from a dielectric standpoint as regarding impermeability and mechanical resistance.

The following composition, given hereinafter by way of example, gives the desired results:

Cellulose materials (moulded paper pulp, wood flour, etc.)	31,20
Pea-nut cakes	47,20
Trisodic prosphate	1,60
Cholesterol	0,30
Cresylic resin	19,70
	100

In this example the charge is constituted by cellulose materials, but use can just as well be made of the charge mentioned in the preceding example, or of any other materials constituting the charge.

This composition gives a plastic powder which can be moulded under a pressure of 75 kilograms per square centimeter at a temperature of 165° C.; the duration of the baking being about 1 minute 30 seconds for thicknesses of 2 millimeters.

The moulded articles have a polished appearance and are waterproof and fire-proof: trials effected on test-pieces made according to this composition, have given a dielectric rigidity of 34,000 volts for a plate having a thickness of 1 millimeter; the rupture load is 2 kilograms, 65 per square millimeter and the resistance to shocks has given with CHARPY'S pendulum a resiliency of 8,1 per square centimeter; furthermore, the moulded product can be readily drilled, threaded and turned.

In this example of realisation with materials rich in vegetable proteins, the impregnation of the charge can take place without rendering the products insoluble by double decomposition by means of a metal salt. The following method of procedure is then adopted: the impregnation of the charge is obtained by mixing pea-nut cakes or rice flour with the cellulose charge (paper waste, moulded paper pulp, wood flour, etc.) in presence of water to which is added either trisodic phosphate, borate of sodium or ammonium for rendering the proteins soluble in water.

The paste is kneaded and coloured pigments are added thereto, then it is dried in a stove and finely crushed. Cholesterol, acting a plastifying agent is incorporated with this powder. Then cresylic resin is added which is separately prepared and obtained either in the liquid or in the solid state and in which have been previously dissolved soluble dye-stuffs; thus, an intimate mixture is obtained of the plastic powder and the cresylic resin which is in small proportion, about 20%; if the resin is in the liquid state, it will be mixed with the powder and the whole will be kneaded and crushed in the hot state; if the resin is in the solid state, it will be necessary to dissolve the resin in a solvent in order to incorporate it with the powder and the solvent will be subsequently eliminated.

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