

# ALIEN PROPERTY CUSTODIAN

## PROCESS FOR OBTAINING TRANSPARENT MOLDED BODIES

Gerhard Schorsch, Brussels, Belgium; vested in the Allen Property Custodian

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This invention relates to a process for obtaining transparent, limpid and stable molded bodies from thermoplastic organic compounds, which process is to be used more particularly for the manufacture of denture material.

It is known that in the manufacture of molded objects from thermoplastic organic compounds by means of plaster molds, special precautionary measures are necessary for eliminating the harmful action which the water vapour escaping from the plaster during the heating of the mold, exerts upon the said thermoplastic organic compounds.

It is also known that plaster molds are of common use for producing denture material from thermoplastic substances. Among the latter substances, the following may be cited: the cellulose esters, the polymerized vinyl and styrol products, the polymerized esters of the acrylic acid and of the substituted acrylic acid (for instance the monomethacrylic acid), the phenoplastic resins.

It has also been proposed to use mixtures of entirely polymerized organic solid bodies with liquid monomeric or partially polymerized compounds which under the action of heat and pressure may be completely polymerized whereby hardening is obtained. All these mixtures are very sensitive to water vapour and practice has shown that if no special measures are taken, the molded objects instead of being transparent have a milky or opalized appearance which becomes stronger in time; moreover they are unstable and their mechanical properties are insufficient.

In order to avoid these drawbacks, various measures have been proposed, consisting for instance in a preliminary heating of the plaster mold before introducing the charge therein, or in a galvanic covering of the walls of the mold in order that the metal covering thus formed shall prevent the water vapor from reaching the charge which fills the mold.

Another process consists in lining the inner walls of the mold with a thin metal sheet before it has been filled, but the placing of a metal lining in position is a delicate, long and costly operation. Moreover, the operation is not always successful and must sometimes be renewed.

The process according to the present invention allows of avoiding all the above drawbacks and of obtaining in an easy manner, even by persons not specialized in this kind of work, molded bodies which are perfectly limpid and stable, from organic compounds of the kind above mentioned, without the necessity of applying delicate hand operations or special precautionary measures.

The invention consists broadly in adding to the

mass to be molded, comparatively small amounts of chlorinated organic substances having a high molecular weight. The addition is preferably effected before the mass is introduced into the mould. Among the substances to be used the following may be cited: chlorinated paraffins, chlorinated di-phenyl compounds and chlorinated naphthalene. My experiments have shown that such additions allow of obtaining perfectly transparent and stable molded bodies.

Among the chlorinated substances, the chlorinated diphenyl compounds give very good results. These compounds may be used, if necessary, in a mixture with other aliphatic or aromatic compounds.

The amount of substances of addition to be used may vary between very large limits and depends more particularly on the molding material used and on the conditions of its use and hardening. Entirely satisfactory results have been obtained in certain cases with amounts lower than 1% in weight of the molding charge. Generally less than ten per cent are sufficient.

It should also be noted that the resinous and wax-like properties of the chlorinated substances, as well as the thermo plastic quality of most of these substances allows of increasing at will the proportion of substances of addition, in order to take advantage of the modifications or advantages resulting from the combination of the specific properties of such chlorinated substances and of the specific properties of the molding substance itself.

The addition of substance of addition may be made at any moment during the manufacture of the thermoplastic substances, but it should preferably be effected before the molding operation. Care should be taken to obtain as homogeneous a distribution as possible of the substances of addition into the material to be molded. When this material consists of mixtures of solid, entirely polymerized compounds with monomeric liquid or/and partially polymerized compounds, which under the action of heat and pressure are capable of becoming entirely polymerized whereby hardening takes place, the substances of addition may be dissolved into the liquid compound before the latter is mixed with the solid compounds, and this allows of obtaining in a simple and particularly advantageous manner a homogeneous distribution of the substances of addition into the material to be molded.

In addition to the substances of addition above mentioned, the mixtures may be also completed by the ordinary additions, such as plastifiers, sol-

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vents, waxes, paraffins, fillers, catalysers such as oxygen-liberating agents, soluble or insoluble dyestuffs, pigments, etc.

Mixtures are known which contain natural or artificial resins, for instance halogen hydrocarbons; such additions however have been proposed for improving the qualities of the mixtures themselves, but it has not been hitherto recognized that a systematic addition of organic chlorinated substances of high molecular weight, more particularly to mixtures of thermoplastic substances and substances capable of being polymerized and of becoming thermoplastic after polymerization, led to new and unexpected effects. Indeed, none of the substances previously proposed allowed of avoiding the necessity of lining the mold with a thin sheet of metal, or of taking the other precautionary measures above mentioned, and which the present invention allows of suppressing completely.

The new technical effect obtained by the process according to the present invention consists in the fact that the mass to be molded under the action of heat and pressure is made insensitive to the action of water vapor, and supplies molded objects which are resistant, limpid and stable.

Examples of carrying the invention into effect will be given hereinafter. In these examples the parts mentioned are parts in weight.

#### Example 1

A mixture is prepared of

Parts monomeric methylacrylic ester.....	60
Parts butylacrylic ester.....	20
Parts acrylic nitrile.....	10
Parts vinyl acetate.....	10

To this mixture 0.08% of a soluble red dye and 0.01% of benzoyl peroxide may be added.

One part of chlorinated naphthalene, more particularly of the product known under the commercial name of "Halowax", and one part of chlorinated di-phenyl, more particularly of the product known under the commercial name of "Arochlor No. 4465", are also added to the mixture.

The mixture thus prepared is heated in a

double-walled mixer provided with a reflux condenser. The liquid becomes more and more viscous and after a few hours the polymerization is ended. Stirring by means of stirring blades or arms leaves the molding material in a state of grains of more or less regular shape.

This mass is used as such for filling an undried plaster mold, of the type usually employed in dental surgery, and the mold is afterwards subjected to pressure and heated until the inner temperature has reached 150° C. After cooling, the molded mass may be withdrawn.

#### Example 2

One part of the product known under the commercial name "Arochlor No. 4465" is dissolved into 40 parts of monomeric methyl methacrylate, and the solution thus obtained is mixed with 60 parts of pulverized and polymerized methyl ester of the methacrylic acid. The mixture is stirred and gives then a rubber-like mass which is immediately used, for instance for filling molds for dental prosthesis, made of undried and non-metallized plaster. After compression, the mold is heated in a water vulcanizer up to 130° C and at a water vapor pressure of about 4 kilos during one hour in all. After cooling, the mould may be withdrawn and cleaned in the usual manner.

The objects molded by means of the substances mentioned in the above examples are resistant, limpid and stable and do not show any trace of alteration, even after several months.

It is to be noted that although the above examples apply more particularly to the manufacture of objects to be used in the dental prosthesis, the process according to the present invention is not limited to the said manufacture but may be used broadly for obtaining molds from organic compounds of the type mentioned and with a view to obtaining resistant, limpid and stable objects.

For the molding operation, use may be made of a mixture consisting of polymerized and pulverized mono-methacrylic acid ester with partially polymerized methacrylic acid ester and with monomeric methacrylic acid ester.

GERHARD SCHORSCH.