

CONDITIONING LIQUIDS FOR TOOTH OR BONE MATTER

The invention relates to liquids for conditioning defective tooth or bone matter for treatment with plastic synthetic material.

Plastic synthetic materials which harden are used as filling materials in the treatment of cavities in tooth or bone matter, especially in the dental field. Acrylate-based fillings are in general preferred as the synthetic materials which harden. However, these polymeric fillings have the disadvantages that they do not stick well to the dentin or bone. To solve this problem, for example, partial undercuts have hitherto been made; for this, it was necessary to remove considerable amounts of fresh dentin beyond the affected region.

In order to avoid these disadvantages, the dentin or the bone has been pretreated in various ways in order to increase the adhesion of the synthetic material.

Thus, it is known to etch the dentin or the enamel surface with strong acids, for example phosphoric acid, and then to carry out the filling operation (Zidan et al., Scand. J. Dental Res. 88, 348 to 351 (1980)). Apart from the irritating effect of the strong acid in the oral region, the adhesion of the filling is inadequate.

It is also known to pretreat the dentin with ethylenediamineacetic acid and then to treat it with a coating agent of an aliphatic aldehyde or a ketone and an olefinically unsaturated monomer, for example an ester of acrylic or methacrylic acid (European Pat. No. A 0,141,324 and European Pat. No. A 0,109,057).

Liquids for conditioning tooth or bone matter have been found, which contain, in aqueous solution, an acid with a pK_A value of less than +5 and an amphoteric amino compound with a pK_A value in the range from 3.9 to 12.5 and a pK_B value in the range from 10.5 to 13.5, the solutions having a pH in the range from 0.1 to 3.5.

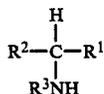
The new liquids according to the invention condition the tooth or bone matter before coating with a priming agent (primer or liner). A plastic synthetic material applied undergoes firm bonding with the tooth or bone matter pretreated in this way.

Acids for the liquids according to the invention have an acid strength [pK_a value] of less than 5, preferably of -9 to +5. The solubility of the acids in water is in general greater than 0.5% by weight, preferably greater than 1% by weight.

The following acids may be mentioned as examples: pyruvic acid, citric acid, oxalic acid, phosphoric acid and nitric acid.

Amphoteric amino compounds for the liquids according to the invention have an acid strength [pK_A value] in the range from 3.9 to 12.5, preferably 9.0 to 10.6, and a base strength [pK_B value] in the range from 10.5 to 13.5, preferably 11.5 to 12.5.

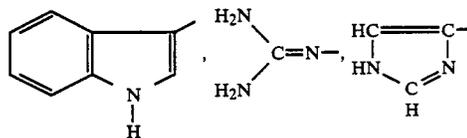
Amphoteric amino compounds which may be mentioned as preferred are those of the formula



in which

R^1 represents a carboxyl group,

R^2 denotes hydrogen or a lower alkyl radical which is optionally substituted by hydroxyl, thio, methylthio, carboxyl, carboxamide, amino, phenyl, hydroxy-phenyl or the groups

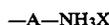


and

R^3 denotes hydrogen or phenyl, and wherein the radicals R^1 and R^3 can be linked via a propyl radical, or in which

R^1 represents hydrogen,

R^2 denotes the group



in which

A represents a divalent alkylene radical with 1 to 6 carbon atoms and

X represents halogen, and

R^3 denotes hydrogen.

The following amphoteric amino compounds may be mentioned as examples: glycine, serine, threonine, cysteine, thryosine, asparagine, glutamine, alanine, valine, leucine, isoleucine, proline, methionine, phenylalanine, tryptophane, lysine, arginine, histidine, N-phenylglycine, ethylenediamine hydrochloride, ethylenediamine hydrobromide, propylenediamine hydrochloride, propylenediamine hydrobromide, butylenediamine hydrochloride and butylenediamine hydrobromide.

Particularly preferred amphoteric amino compounds are glycine, phenylalanine, lysine and ethylenediamine hydrochloride.

A process has also been found for the preparation of liquids for conditioning tooth or bone matter, which is characterized in that an aqueous solution of an acid with a pK_A value of less than 5 and an amphoteric amino compound with a pK_a value in the range from 3.9 to 12.5 and a pK_B value in the range from 10.5 to 13.5 are reacted, a pH in the range from 0.1 to 3.5 being maintained.

The pH for the process according to the invention can be maintained in a manner which is known per se, for example with the aid of suitable indicators or with the aid of potentiometric measurement methods (Ullman Volume 5, 926 to 936 (1980)).

The components are in general brought together with vigorous stirring in the preparation of the liquids according to the invention. The components are in general brought together at room temperature, for example in the temperature range from 0° to 30° C.

When used, the liquids according to the invention are applied to the defective tooth or bone matter, for example in a cavity. Cavities in the enamel or dentin may be mentioned here as preferred.

After the application of the liquids according to the invention, they are in general dried, for example with warm air.

Before treatment of the defective tooth or bone matter with the plastic synthetic material, coating with a primer material is preferably carried out after conditioning with the liquids according to the invention.