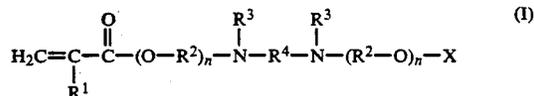


## ADHESIVE COMPONENTS CONTAINING ALKANEDIYL-BIS-CARBOXAMIDES FOR THE TREATMENT OF COLLAGEN

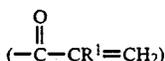
The invention relates to new alkanediyl-bis-carboxamides (I) and preparations (II) which contain compounds (Ia) for use as an adhesive component for the treatment of collagen-containing materials, and to processes for the production and the use of the preparations (II).

The new alkanediyl-bis-carboxamides correspond to the formula (I)



in which

- R<sup>1</sup> denotes hydrogen or methyl,  
R<sup>2</sup> and R<sup>4</sup> denote divalent aliphatic radicals having two or three carbon atoms,  
R<sup>3</sup> denotes formyl (—CO—H),  
X denotes hydrogen or (meth)acryloyl

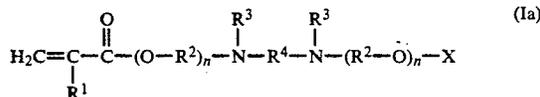


and

n represents 1.

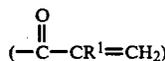
The invention also extends to preparations (II) which contain compounds (Ia) for use as an adhesive component for the treatment of collagen-containing materials, and to processes for the production and the use of the preparations (II).

The claimed preparations (II) contain alkanediyl-bis-carboxamides (Ia) of the formula



in which

- R<sup>1</sup> denotes hydrogen or methyl,  
R<sup>2</sup> and R<sup>4</sup> denote divalent aliphatic radicals having one to three carbon atoms,  
R<sup>3</sup> denotes hydrogen or formyl (—CO—H),  
X denotes hydrogen or (meth)acryloyl



and

n represents 0 or 1, with the proviso that when R<sup>3</sup> equals H, n is zero, and, if appropriate, additives such as initiators, solvents and fillers.

Collagen-containing materials are albuminoid bodies and principal constituents of the human and animal intercellular supporting substances, such as cartilage and bone tissue, skin and dentine. In the context of the present invention, the adhesive components are preferably used for the treatment of dentine in connection with dental repairs.

Particularly in the dental field, setting polymeric materials are used as filling materials in dental repairs. In general, fillings based on acrylates are preferred as setting polymeric materials. However, these polymeric fillings have the disadvantage that they adhere poorly to the dentine. In order to solve this problem, undercuttings to the dental bone have sometimes been carried out hitherto; for this purpose it was necessary to remove considerable amounts of fresh dentine beyond the affected region.

According to another method, the dentine and the enamel surface are etched with acids, such as, for example, phosphoric acid, and the filling is then performed. Apart from the fact that the acid exerts an irritant action in the oral region, it also penetrates easily into the tooth through the dental tubules and damages the nerve (pulp).

In J. Dent. Res. 57, 500-505 (1978), aldehyde group-containing methacrylates of the isomeric hydroxybenzaldehydes are described which can be used as foundations for fillings in the dental field. However, even after such a foundation, the bond between dentine and filling material remains unsatisfactory.

In Scand. J. Dent. Res. 92, 980-983 (1948) and J. Dent. Res. 63, 1087-1089 (1984), foundations based on aqueous formaldehyde or glutaraldehyde and β-hydroxyethyl methacrylate (HEMA) are described.

In addition, compositions formed from an aldehyde and an olefinically unsaturated monomer containing active hydrogen, which bond well to dentine, are described in EP-A-0,141,324.

The new preparations (II) based on alkanediyl-bis-carboxamides effect a strong adhesive bonding of materials which are intended to be attached to collagen, for example an adhesive bonding of dental filling material in a cavity in the tooth.

N,N'-Methylene- and N,N'-ethylene-bis-(meth)acrylamides are known compounds (Röhm GmbH) and have been employed for the immobilization of thio-glycosides (Lee et al., Anal. Biochem. 95 (1979), 260) and as constituents in textile finishing agents (US 518,779, JP 82/95,307, EP 120,316).

Formamide group-containing (meth)acrylic acid esters are known from DE-A-2,507,189. In DE-A-2,507,189 the use of these acrylic acid esters as coatings or adhesives for paper and textiles is also described.

The use of the alkanediyl-bis-carboxamides (Ia) according to the invention as an adhesive component for collagen-containing materials was surprising since they contain no reactive groups which under mild conditions can build up suitable chemical bonds to collagen-containing materials.

For example, the following alkanediyl-bis-carboxamides according to the invention may be mentioned:

