It is therefore an object of the invention to provide a process for preparing precondensates or oligomers of semicrystalline or amorphous, thermoplastically processible, semiaromatic polyamides, which does not have the disadvantages of a batchwise operation. It is a further object of the invention to provide a process for converting the oligomers to higher molecular weight polyamides suitable for preparation of thermoplastically processible molding compositions.

It has now been found that, surprisingly, this object is achieved when, in a continuous process, an aqueous solution of polyamide-forming monomers is heated beyond a dissolution or storage temperature, the residence time of the monomer salt solution in the oligomerization reactor being limited and the pressure or the partial vapor pressure of the water being adjusted such that a conversion of monomers to polyamide oligomers does not exceed a maximum value and/or the polyamide oligomers formed do not phase-separate or spontaneously crystallize in solid form.

SUMMARY ~~OF THE INVENTION~~

The ~~invention~~ disclosure~~therefore~~ provides a process for continuously preparing polyamide oligomers. This comprises continuous conveying of an aqueous solution of polyamide-forming monomers from a reservoir vessel into an oligomerization reactor, heating of the aqueous solution beyond a dissolution or storage temperature, the residence time of the monomer solution in the oligomerization reactor being limited and the pressure or the partial vapor pressure of the water being adjusted such that a conversion of monomers to polyamide oligomers does not exceed a maximum value and/or the polyamide oligomers formed do not phase-separate or spontaneously crystallize in solid form, and continuous discharge of the polyamide oligomers from the oligomerization reactor. It enables the continuous preparation of polyamide oligomers, such that the typical disadvantages of a batchwise process, such as limitation of the batch size, loss of time resulting from filling, emptying and cleaning of the reaction vessel and tendency for deposits to form on the inner wall of the reaction vessel, are avoided.

In an aspect, there is provided a process for continuously preparing polyamide oligomers, comprising

- continuous conveying of an aqueous solution of polyamide-forming monomers from a reservoir vessel into an oligomerization reactor,
- heating the aqueous solution beyond a dissolution or storage temperature, the residence time of the monomer solution in the oligomerization reactor being limited and the pressure or the partial vapor pressure of the water being adjusted such that a conversion of monomers to polyamide oligomers does

not exceed a maximum value and/or the polyamide oligomers formed do not phase-separate or spontaneously crystallize in solid form, and

- continuous discharge of the polyamide oligomers from the oligomerization reactor.

In another aspect, there is provided a polyamide oligomer preparable by a process as defined above and hereinafter.

A polyamide oligomer producible by means of this process features high constancy of quality and a narrow molar mass distribution.

The ~~invention~~ disclosure further provides a process in which, proceeding from the polyamide oligomer, higher molecular weight, semicrystalline or amorphous, thermoplastically processible polyamides are prepared. The process comprises continuous provision of a mixture comprising water and the polyamide oligomer and postcondensation of the polyamide oligomer to give a polyamide.

In another aspect, there is provided a process for preparing a semicrystalline or amorphous, thermoplastically processible polyamide, comprising

- continuous provision of a mixture comprising water and a polyamide oligomer as defined above and hereinafter, and
- postcondensation of the polyamide oligomer to give a polyamide.

In another aspect, there is provided a polyamide preparable by a process as defined above and hereinafter.

~~The invention further provides for~~In another aspect, there is provided the use of a semiaromatic polyamide obtainable by a process as defined above and hereinafter, preferably for production of electrical and electronic components and for high-temperature automotive applications.

~~The invention further provides for~~ In another aspect, there is provided the use of an aliphatic polyamide as defined above or hereinafter or obtainable by a process as defined above and hereinafter for production of films, monofilaments, fibers, yarns or textile fabrics.

DETAILED DESCRIPTION OF THE INVENTION

The term "polyamides" hereinafter encompasses homo- and copolyamides. The polyamides are designated in the context of the invention using abbreviations, some of which are customary in the art, which consist of the letters PA followed by numbers and letters. Some of these abbreviations are defined in DIN EN ISO 1043-1. Polyamides which can be derived from aminocarboxylic acids of the H_2N-$(CH_2)_z$-COOH type or the corresponding lactams are identified as PA Z where Z denotes the number of carbon atoms in the monomer. For example, PA 6 represents the polymer of ε-caprolactam or of ε-aminocaproic acid. Polyamides derivable from diamines and dicarboxylic acids of the H_2N-$(CH_2)_x$-NH_2 and HOOC-$(CH_2)_y$-COOH types are identified as PA xy where x denotes the number of carbon atoms in the diamine and y the number of carbon atoms in the dicarboxylic acid. Copolyamides are designated by listing the components in the sequence of their proportions, separated by slashes. For example, PA 66/610 is the copolyamide of hexamethylenediamine, adipic acid and sebacic acid. For the monomers having an aromatic or cycloaliphatic group which are used in accordance with the invention, the following letter abbreviations are used: T = terephthalic acid, I = isophthalic acid, MXDA = m-xylylenediamine, IPDA = isophoronediamine, PACM = 4,4'-methylenebis(cyclohexylamine), MACM = 2,2'-dimethyl-4,4'-methylenebis(cyclohexylamine).

Hereinafter, the expression "C_1-C_4-alkyl" comprises unsubstituted straight-chain and branched C_1-C_4-alkyl groups. Examples of C_1-C_4-alkyl groups are especially methyl, ethyl, propyl, isopropyl, n-butyl, isobutyl, sec-butyl and tert-butyl (1,1-dimethylethyl).

In the aromatic dicarboxylic acids, aliphatic dicarboxylic acids, cycloaliphatic dicarboxylic acids and monocarboxylic acids mentioned hereinafter, the carboxyl groups may each be present in underivatized form or in the form of derivatives. In the case of dicarboxylic acids, neither carboxyl group, one carboxyl group or both carboxyl groups may be in the form of a derivative. Suitable derivatives are anhydrides, esters,