



(12)

Geänderte Patentschrift

Europäische Veröffentlichungsnummer
(97) **EP 2 336 223 B1**
(21) Deutsches Aktenzeichen: **60 2009 005 183.0**
(96) Europäisches Aktenzeichen: **09 17 8404.1**
(96) Europäischer Anmeldetag: **08.12.2009**
(97) Erstveröffentlichung durch das EPA: **22.06.2011**
(97) Veröffentlichungstag
der Patenterteilung beim EPA: **08.02.2012**
(45) Veröffentlichungstag
des geänderten Patents im Patentblatt: **09.01.2025**

(51) Int Cl.: **C08J 9/00** (2006.01)
C08G 18/08 (2006.01)

Patent nach Nichtigkeitsverfahren beschränkt aufrechterhalten

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(54) Bezeichnung: **Verfahren zur Herstellung von flexiblem, elastischem Polyurethanschaum und damit erhaltener Schaum**

(57) Hauptanspruch: A process for the preparation of a flexible polyurethane foam having an organogel material incorporated therein, which forms at least part of the cell ribs and/or cell walls of the polyurethane foam, wherein in the process a reaction mixture, which comprises a blowing agent, is allowed to foam to produce the polyurethane foam, characterised in that before allowing said reaction mixture to foam, the organogel material is dispersed therein.

Beschreibung

[0001] Der X. Zivilsenat des Bundesgerichtshofs hat auf die mündliche Verhandlung vom 30. Januar 2024 für Recht erkannt:

Auf die Berufung der Beklagten wird das Urteil des 3. Senats (Nichtigkeitssenats) des Bundespatentgerichts vom 9. November 2021 abgeändert.

[0002] Das europäische Patent 2 336 223 wird mit Wirkung für die Bundesrepublik Deutschland dadurch für teilweise nichtig erklärt, dass Patentanspruch 1 die nachfolgende Fassung erhält, sich alle anderen Patentansprüche auf diese Fassung beziehen und an die Stelle der Patentansprüche 10 bis 15 die nachfolgenden Patentansprüche 10 bis 14 treten.

Patentansprüche

1. A process for the preparation of a flexible polyurethane foam having an organogel material incorporated therein, which forms at least part of the cell ribs and/or cell walls of the polyurethane foam, wherein in the process a reaction mixture, which comprises a blowing agent, is allowed to foam to produce the polyurethane foam, characterised in that before allowing said reaction mixture to foam, the organogel material is dispersed therein.

2. A process according to claim 1, characterised in that said organogel material is dispersed in the reaction mixture in an amount of at least 0.1 wt. %, preferably at least 1 wt. %, more preferably at least 5 wt. % and most preferably at least 10 wt. %, calculated on the total weight of the polyurethane foam prepared from the reaction mixture.

3. A process according to claim 1 or 2, characterised in that said organogel material is dispersed in the reaction mixture in an amount of less than 40 wt. %, preferably less than 30 wt. % and more preferably less than 20 wt. %, calculated on the total weight of the polyurethane foam prepared from the reaction mixture.

4. A process according to any one of the claims 1 to 3, characterised in that said organogel material is a gel selected from the group consisting of polyurethane gels, oil extended thermoplastic block copolymer gels, in particular SEBS gels, silicone gels and PVC plastisol gels, and the organogel material being preferably a polyurethane gel.

5. A process according to any one of the claims 1 to 4, characterised in that said organogel material is dispersed in said reaction mixture in the form of particles having an average volume of between 0.001 and 10 mm³, which average volume is preferably larger than 0.01 mm³, more preferably larger

than 0.1 mm³, and preferably smaller than 2 mm³, more preferably smaller than 0.5 mm³.

6. A process according to any one of the claims 1 to 5, characterised in that said reaction mixture is a polyurethane reaction mixture composed by mixing at least an isocyanate component and an isocyanate reactive component, at least a portion of said organogel material being dispersed in said isocyanate reactive component before mixing it with the isocyanate component.

7. A process according to any one of the claims 1 to 6, characterised in that said reaction mixture is a polyurethane reaction mixture composed by mixing at least an isocyanate component and an isocyanate reactive component, the isocyanate reactive component comprising isocyanate reactive compounds including, per 100 parts by weight thereof, a) 50 to 80 parts of one or more polyoxyalkylene polyols having an oxyethylene unit content of at least 40 wt. % preferably of at least 50 wt. %, more preferably of at least 60 wt. % and most preferably of at least 70 wt. %, of the oxyalkylene units of the polyoxyalkylene polyol, a hydroxyl number of between 20 and 100, preferably of between 20 and 60, and a nominal functionality of 2 to 4, the oxyethylene unit content being preferably smaller than 90 wt. %, preferably smaller than 85 wt. % and more preferably smaller than 80 wt. %, of the oxyalkylene units of the polyoxyalkylene polyol; and b) 20 to 50 parts of one or more further polyoxyalkylene polyols containing no oxyethylene units or having an oxyethylene unit content lower than 40 wt. % of the oxyalkylene units of the further polyoxyalkylene polyol, and having a hydroxyl number of between 20 and 100, preferably of between 20 and 60, and a nominal functionality of 2 to 4, the isocyanate reactive compounds comprising, per 100 parts by weight thereof, preferably at least 85 parts, and more preferably at least 95 parts, of said one or more polyoxyalkylene polyols and said one or more further polyoxyalkylene polyols.

8. A process according to claim 7, characterised in that the isocyanate reactive compounds comprise, per 100 parts by weight thereof, at least 55 parts, preferably at least 60 parts, more preferably at least 65 parts of said one or more polyoxyalkylene polyols which have an oxyethylene unit content of at least 40 wt. %.

9. A process as claimed in claim 7 or 8, characterised in that the isocyanate reactive compounds comprise, per 100 parts by weight thereof, less than 75 parts of said one or more polyoxyalkylene polyols which have an oxyethylene unit content of at least 40 wt. %.

10. A flexible polyurethane foam prepared by a process according to any one of the claims 1 to 9, characterised in that said organogel material is incorporated in the foam to form at least part of the cell ribs and/or cell walls.

11. A flexible polyurethane foam according to claim 10, characterised in that the organogel material forms inclusions in said cell ribs and/or cell walls.

12. A flexible polyurethane foam according to any one of the claims 10 to 11, characterised in that the reaction mixture comprises such an amount of said blowing agent that the prepared polyurethane foam has a density of between 25 and 120 kg/m³, the density of the prepared polyurethane foam being preferably lower than 100 kg/m³ and more preferably lower than 80 kg/m³.

13. A flexible polyurethane foam according to any one of the claims 10 to 12, characterised in that the prepared polyurethane foam has a resilience, measured at 20°C in accordance with ASTM D 3574 H, higher than 35 % and preferably higher than 45 %.

14. A flexible polyurethane foam according to any one of the claims 10 to 13, characterised in that the prepared polyurethane foam has an ILD 40% hardness, measured in accordance with ISO 2439 B, between 60 and 500 N, and preferably between 75 and 200 N.

Es folgen keine Zeichnungen