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(54) Title: POLYAMIDE RECOVERY PROCESS

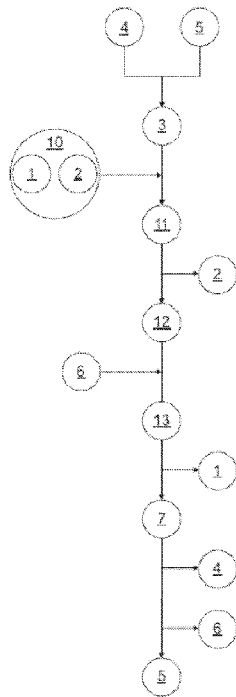


Fig. 1

(57) Abstract: Provided is a process for recovery of polyamides (1) from a material (10) comprising polyamides (1) and pollutants (2), said process comprising: a phase of preparing a first solution (3) being a deep eutectic solvent and including at least methanol (4) and at least one salt (5); a solubilization phase in which the material (10) is added to the first solution (3) to obtain a first mixture (11) in which the polyamides (1) bind to the salt (5); a first filtration phase in which pollutants (2) are separated from the first mixture (11) to obtain a second mixture (12) including polyamides (1) bound to salt (5) and methanol (4); a separation phase in which a separating agent (6) is added to the second mixture (12) to subtract the salt (5) from both the methanol (4) and the polyamides (1) and obtain a third mixture (13) in which the salt (5) and the polyamides (1) are again separated; a second filtration phase in which the third mixture (13) is subjected to filtration so as to obtain the polyamides (1) and a second solution (7).



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## AMENDED CLAIMS

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## CLAIMS

1. A process for recovering polyamides (1) from a material (10) comprising said polyamides (1) and pollutants (2), said process comprising:

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- a phase of preparing a first solution (3) comprising at least methanol (4) and at least one salt (5);
  - a solubilization phase in which said material (10) is added to said first solution (3) to obtain a first mixture (11) in which said polyamides (1) bind to said salt (5);
  - a first filtration phase in which said pollutants (2) are separated from said first mixture (11) to obtain a second mixture (12) including said polyamides (1) bound to said salt (5) and said methanol (4);
  - 10 – a separation phase in which a separating agent (6) is added to said second mixture (12) to subtract said salt (5) from both said methanol (4) and said polyamides (1) and obtain a third mixture (13) in which said salt (5) and said polyamides (1) are again separated;
  - a second filtration phase in which said third mixture (13) is subjected to filtration so as to obtain said polyamides (1) and a second solution (7);
  - 15 and characterized by the fact that
  - said first solution (3) is a deep eutectic solvent,
  - said second filtration phase occurs at a temperature below the boiling temperature of said methanol (4).

2. Process according to claim 1, wherein said first filtration phase occurs at a temperature below the boiling temperature of said methanol (4).

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3. Process according to claim 1 or 2, comprising a recovery phase, subsequent to said second filtration phase, wherein said methanol (4), said salt (5) and said separating agent (6) are separated from said second solution (7).

4. Process according to any one of the preceding claims, wherein said methanol (4) is separated from said second mixture (12) prior to said filtration of said polyamides (1).

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5. Process according to the preceding claim wherein, subsequent to said first filtration phase, said second mixture (12) is subjected to a first partial separation phase in which said methanol (4) is separated from said second mixture (12) by distillation to obtain a fourth mixture (14).

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6. Process according to the preceding claim, wherein said fourth mixture (14) is subjected to a second partial recovery phase wherein said fourth mixture (14) is added to said separating agent (6) so as to obtain a fifth mixture (15).

7. Process according to the preceding claim, wherein said second partial recovery phase is followed by said second filtration phase, wherein said fifth mixture (15) is subjected to filtration so as to separate said polyamides (1) and obtain a third solution (8).

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8. Process according to the preceding claim, wherein, in said recovery phase, from said third solution (8) said separating agent (6) is separated in order that said salt (5) and said separating agent (6) are obtained

separately.

9. Process according to any of the preceding claims, wherein said polyamides (1) include a polymer selected between nylon 6 and nylon 6,6.

5 10. Process according to any one of the preceding claims, wherein said salt (5) comprises at least one selected from  $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ , NaSCN,  $\text{CaI}_2 \cdot 4\text{H}_2\text{O}$  and calcium salicylate.

11. Process according to any one of the preceding claims, wherein said separating agent (6) comprises at least one selected from 1-butanol, acetamide and Dimethyl sulfoxide.

12. Process according to any one of the preceding claims, comprising a preliminary phase of reducing the size of said material (10).

10 13. Process according to any one of the preceding claims, wherein the amount of said salt (5) is maintained in a 1:1 molar ratio with the monomeric residue of said polyamides (1).

14. Use of a solution comprising at least methanol (4) and at least one salt (5), said solution being a deep eutectic solvent, for the purification and recovery of polyamides.