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(54) Title: HIGHLY INTEGRATED PROCESS FOR PREPARING POLYAMIDE 6 FROM POLYAMIDE 6 CONTAINING WASTE

(57) Abstract: An integrated process for preparing polyamide 6, comprising (i) providing a stream S_{MR} comprising a solid material M_R comprising polyamide 6, wherein the solid material M_R comprises a waste material; (ii) preparing from the stream S_{MR} in a depolymerisation and purification unit U_{DP} a stream S_{CPL} comprising purified ε-caprolactam, the unit U_{DP} comprising at least one depolymerization sub-unit U_D; (iii) passing the stream S_{CPL} to a polyamide 6 production unit U_{PA}; (iv) subjecting the stream S_{CPL} in U_{PA} to ε-caprolactam polymerization conditions, obtaining from U_{PA} a polyamide 6 material M_P and a stream comprising water and one or more ε-caprolactam oligomers; (v) optionally subjecting to stream comprising water and one or more ε-caprolactam oligomers to concentration with respect to the one or more ε-caprolactam oligomers in at least one concentration stage, obtaining a concentrated stream comprising water and one or more ε-caprolactam oligomers; (vi) passing the optionally concentrated stream comprising water and one or more ε-caprolactam oligomers into at least one of the depolymerization sub-units U_D according to (ii).