CLAIMS

1. Process for treating a plastic feedstock comprising polyolefins, comprising:
   a) a dissolution step involving placing the plastic feedstock in contact with a dissolution solvent, at a dissolution temperature of between 150°C and 250°C and a dissolution pressure of between 1.5 and 15.0 MPa abs, the dissolution solvent being chosen from at least one organic solvent having a boiling point of between 75°C and 250°C and comprising one or more alkanes containing between 6 and 10 carbon atoms, to obtain at least one crude polymer solution;

   b) a step of adsorption by placing the crude polymer solution obtained from step a) in contact with at least one adsorbent, at a temperature of between 100 and 300°C and a pressure of between 1.0 and 20.0 MPa abs, to obtain at least one refined polymer solution; and then

   c) a step of recovering the polymers, to obtain at least one solvent fraction and one purified polyolefins fraction.

2. Process according to Claim 1, in which the dissolution solvent is chosen from organic solvents with a boiling point of between 80°C and 220°C, preferably between 80°C and 180°C.

3. Process according to Claim 1 or 2, in which the dissolution solvent has a critical temperature of between 200 and 390°C and preferably between 250 and 350°C, and a critical pressure of between 2.0 and 4.3 MPa abs and preferably between 2.4 and 4.2 MPa abs.

4. Process according to one of the preceding claims, in which the dissolution pressure in step a) is between 2.0 and 10.0 MPa abs.

5. Process according to one of Claims 1 to 3, in which the dissolution pressure in step a) is between 1.5 and 2.4 MPa abs and preferably between 1.7 and 2.2 MPa abs.

6. Process according to one of the preceding claims, in which the adsorption step b) is performed at the dissolution temperature and the dissolution pressure of step a).

7. Process according to one of the preceding claims, in which the adsorption step b) is performed in the presence of at least one adsorbent, which is preferably solid, and in particular in the form of a fixed bed, an entrained bed or in the form of an ebullated bed, preferably in the form of a fixed bed or an entrained bed.

8. Process according to one of the preceding claims, in which the adsorbent is an alumina, a silica, a silica-alumina, an active charcoal, a decolourizing earth, or mixtures thereof, preferably an active charcoal, a decolourizing earth or mixtures thereof.

9. Process according to one of the preceding claims, in which the polymer recovery step c) includes a solvent recovery section at a temperature of between 0 and 350°C, preferably between 5 and 300°C and preferably between 10 and 250°C, and at a pressure of between

0.1 and 20.0 MPa abs, preferably between 0.1 and 15.0 MPa abs and very preferably between 0.1 and 10.0 MPa abs.

10. Process according to one of the preceding claims, in which the polymer recovery step c) includes at least one solvent recovery section under temperature and pressure conditions adjusted so as to be under supercritical conditions of the dissolution solvent.

11. Process according to one of the preceding claims, comprising a step E1) of separating out the insoluble matter by solid-liquid separation, at a temperature of between 100°C and 300°C, and at a pressure of between 1.0 and 20.0 MPa abs, situated between the dissolution step a) and the polymer recovery step c), and upstream or downstream of the adsorption step b), preferably upstream of the adsorption step b), and in which the step E1) of separating out the insoluble matter preferably includes an electrostatic separator and/or a filter and/or a sand filter.

12. Process according to one of the preceding claims, comprising a step E2) of washing with a dense solution, at a temperature of between 100°C and 300°C, and at a pressure of between 1.0 and 20.0 MPa abs, situated between the dissolution step a) and the polymer recovery step c), and upstream or downstream of the adsorption step b), preferably upstream of the adsorption step b), the dense solution having a density of greater than or equal to 0.85, preferably greater than or equal to 0.9, preferentially greater than or equal to 1.0, the dense solution very preferably being an aqueous solution.

13. Process according to one of the preceding claims, comprising a step E3) of extraction by placing in contact with an extraction solvent, at a temperature of between 100°C and 300°C, a pressure of between 1.0 and 20.0 MPa abs, in which the extraction solvent is preferably an organic solvent which has a critical temperature of between 90 and 400°C, preferably between 200 and 390°C and preferably between 250 and 350°C, and a critical pressure of between 1.5 and 5.0 MPa abs, preferably between 2.0 and 4.3 MPa abs and preferably between 2.4 and 4.2 MPa abs, to obtain at least one extracted polymer solution and one spent solvent.

14. Process according to one of the preceding claims, comprising:

a) a dissolution step involving placing the plastic feedstock in contact with a dissolution solvent, at a dissolution temperature of between 150°C and 250°C and a dissolution pressure of between 1.5 and 15.0 MPa abs, to obtain at least one crude polymer solution;

E1) a step of separating out the insoluble matter by solid-liquid separation, at a temperature of between 100 and 300°C and at a pressure of between 1.0 and 20.0 MPa abs, said step E1) being fed with the crude polymer solution obtained from step a), to obtain at least one clarified polymer solution and one insoluble fraction;

b) a step of adsorption by placing the clarified polymer solution in contact with at least one adsorbent, at a temperature of between 100 and 300°C and a pressure of between 1.0 and 20.0 MPa abs, to obtain at least one refined polymer solution; and then

c) a polymer recovery step, to obtain at least one solvent fraction and one purified polymer fraction, said polymer recovery step preferably including at least one solvent recovery

section under temperature and pressure conditions adjusted so as to be under supercritical conditions of the dissolution solvent.