CLAIMS

1) Method for extracting an additive from a material containing a polymer matrix and said additive comprising the steps of

a) bringing into contact said material with a pressurized dense fluid in a single-vessel device at a temperature T and a pressure p at which said pressurized dense fluid is saturated with said additive and

b) creating in said single-vessel device either a temperature gradient or a pressure gradient whereby said single-vessel device presents a gradient of solubility of said additive with a zone of minimum solubility in which said additive precipitates or crystallizes and a zone of maximum solubility containing said material depleted in said additive,

step a) and step b) being performed simultaneously or one after the other one,

said additive being an organic flame-retardant and

said polymer matrix being formed of one or more thermoplastic polymers, one or more thermosetting polymers, one or more glassy polymers or a mixture thereof.

2) Extraction method according to claim 1, wherein said material is a composite material.

3) Extraction method according to claim 1 or 2, wherein said additive is an organic halogen-based flame retardant.

4) Extraction method according to any one of claims 1 to 3, wherein said material is a waste electronic and electrical equipment, a waste furniture, a waste vehicle or one of their mixtures.

5) Extraction method according to any one of claims 1 to 4, wherein, before said step (a), said material is submitted to a sorting treatment, followed by a shredding treatment and then a grinding or crushing treatment.

6) Extraction method according to any one of claims 1 to 5, wherein said pressurized dense fluid is selected from the group consisting of carbon dioxide, nitric oxide, nitrous oxide, argon, ammonia, Freon-22, Freon-23, and any mixture thereof.

7) Extraction method according to any one of claims 1 to 6, wherein said pressurized dense fluid is carbon dioxide and more particularly supercritical carbon dioxide.

8) Extraction method according to claims 1 to 7, wherein the temperature in said zone of maximum solubility ranges from 32°C to 200°C, and, in particular, from 60°C to 150°C and/or the pressure in said zone of maximum solubility ranges from 7.4 MPa to 100 MPa, and, in particular, from 20 MPa to 50 MPa.

9) Extraction method according to claims 1 to 8, wherein the solute transport between said zone of maximum solubility and said zone of minimum solubility is enhanced thanks to pressurization-depressurization cycles or dynamic flow.