(polymerization) so as to form solid materials from a formerly liquid material. Depolymerization reverses this process. The chains are broken up again by the action of heat and products having shortened chain lengths, e.g. oils again (moderate length), but also waxes (somewhat longer chains, also liquid on heating) and gases (very short chains), which are all readily suitable for producing energy, and in the case of the oils also able to be stored and transported very well, arise. These can also be used as starting material of the process of the invention.

The objects of the invention are achieved by the used oil being used as starting material and being subjected to vaporization by at least indirect contact of the starting material with a melt bath, the melting temperature of which is above the vaporization temperature but below the ignition temperature of the used oil, and the vapor being rectified in the rectification column.

The used oil is distilled in the process. Here, the specific energy introduction system in the main reactor ensures very controllable and rapid heating of the used oil.

According to a first aspect of the present invention, there is provided a process for purifying contaminated used oil where the starting material is heated until it is in the gas phase and the vapor formed is rectified, where purified oil is taken off as condensate from an offtake in a rectification column, characterized in that the used oil is used as starting material and is subjected to vaporization by at least indirect contact of the starting material with a melt bath, having a melting point which is above the vaporization temperature but below the ignition temperature of the used oil and the vapor is rectified in the rectification column.

According to a second aspect of the present invention, there is provided an apparatus for purifying contaminated used oil, comprising a main reactor and a rectification column connected thereto, characterized in that the main reactor is configured as melt bath evaporator, by a reactor space being filled with a melt bath material having a melting point above the vaporization temperature but below the ignition temperature of the used oil, the reactor space being provided with a heating device and an inlet for the used oil being arranged in the reactor.

One embodiment of the process of the invention provides for a flash evaporation to be carried out by the starting material being introduced directly into the melt bath. This flash evaporation occurs within a few milliseconds. The flash evaporation or flash pyrolysis separates off undesirable materials and converts the oil fraction highly efficiently into the gas phase.

In another embodiment of the process of the invention, it is provided that the starting material is introduced indirectly into the melt bath by being passed through the melt bath without a direct connection and via a thermally conductive

Claims

1. A process for purifying contaminated used oil where the starting material is heated until it is in the gas phase and the vapor formed is rectified, where purified oil is taken off as condensate from an offtake in a rectification column, characterized in that the used oil is used as starting material and is subjected to vaporization by at least indirect contact of the starting material with a melt bath, having a melting point which is above the vaporization temperature but below the ignition temperature of the used oil and the vapor is rectified in the rectification column.

2. The process as claimed in claim 1, characterized in that a flash evaporation is carried out by the starting material being fed directly to the melt bath.

3. The process as claimed in claim 1, characterized in that the starting material is fed indirectly to the melt bath by being conveyed through the melt bath without a direct connection and via a thermally conductive connection with said melt bath.

4. The process as claimed in any of claims 1 to 3, characterized in that liquid metal is used as melt bath.

5. The process as claimed in claim 4, characterized in that tin or lead is used as metal.

6. The process as claimed in any of claims 1 to 5,

characterized in that a condensate is fed to renewed rectification.

7. An apparatus for purifying contaminated used oil, comprising a main reactor and a rectification column connected thereto, characterized in that the main reactor is configured as melt bath evaporator, by a reactor space being filled with a melt bath material having a melting point above the vaporization temperature but below the ignition temperature of the used oil, the reactor space being provided with a heating device and an inlet for the used oil being arranged in the reactor.

8. The apparatus as claimed in claim 7, characterized in that a direct thermally conductive connection between the used oil and the melt bath is realized in the reactor space by the inlet into the reactor being formed directly into the melt bath.

9. The apparatus as claimed in claim 8, characterized in that impingement plates located behind one another in the vapor flow direction are installed above the melt bath, where each of these impingement plates has a lateral opening, where these openings are offset in such a way that they do not lie above one another in the vapor flow direction but instead cover one another.

10. The apparatus as claimed in claim 8, characterized in that the impingement plates are arranged in the reactor space of the main reactor.

11. The apparatus as claimed in claim 9, characterized

in that an indirect thermally conductive connection between the used oil and the melt bath is provided in the reactor space by a dividing wall by means of which the used oil is separated from the melt bath being provided between the used oil and the melt bath.

12. The apparatus as claimed in claim 11, characterized in that a heat exchanger having an inlet and an outlet is installed in the reactor space of the main reactor, with the inlet forming the entry point for the used oil and the outlet thereof opening into the inlet of the rectification column.

13. The apparatus as claimed in claim 12, characterized in that the inlet is arranged on the side of the main reactor facing the rectification column and the outlet is arranged on the side of the main reactor facing away from the rectification column.

14. The apparatus as claimed in claim 13, characterized in that the heat exchanger is configured as a tube whose one side forms the inlet and whose other side forms the outlet.

15. The apparatus as claimed in claim 13 or 14, characterized in that the tube is helically wound.