Claims

1. A process of removing volatile compounds from a concentrated fluid (L) containing at least one non-volatile polymer and at least one volatile compound which comprises at least the step of:

a) feeding a concentrated fluid into at least one drying unit, the drying unit comprising in flow direction at least

I) a first drying section (8) and

II) a main extruder section (9) comprising at least an

- extruder degassing section comprising at least a conveying section and a vent port with one or more vapor lines,
- an accumulating section and an outlet section,

whereby volatile compounds are removed through the vent ports and vapor lines;

whereby

- the first drying section is either a kneader or a first extruder and the main extruder section is a main extruder or
- the drying section and the main extruder section are both part of a main extruder, whereby the drying section is upstream the main extruder section and has a smaller cross section than the main extruder section and
- the product obtained at the outlet section of the main extruder is substantially free of volatile compounds.

2. The process pursuant to claims 1, characterized in that the non-volatile polymers are synthetic rubber products.

3. The process pursuant to claim 2, characterized in that the synthetic rubber product are halogenated butyl rubbers.

4. The process pursuant to claims 1 to 3, characterized in that the Fluid (F) contains from 3 to 50 wt % of a non-volatile polymer and from 60 to 97 wt% volatile compounds, whereby the aforementioned components add up to 90 to 100 of the total mass of fluid (F).

5. The process pursuant to claims 1 to 4, characterized in that the first drying section is a first extruder and the main extruder section is a main extruder.

6. The process pursuant to claims 1 to 5, characterized in that the drying section and the main extruder section are both part of a main extruder, whereby the drying section is upstream the main extruder section and has a smaller cross section than the main extruder section.

7. The process pursuant to claim 5, characterized in that the main extruder has a larger cross sectional area than the first extruder.

8. The process pursuant to claims 1 to 7, characterized in that the vent ports (15) are designed to prevent the material from coming out of the vent ports.

9. The process pursuant to claim 5, characterized in that the vent ports (15)are equipped with stuffer screws.

10. The process pursuant to claims 5 to 9, characterized in that the main extruder is operated in such a manner that the dimensionless throughput $V/(n*d^3)$ is adjusted to from 0.01 to 0.7.

11. The process pursuant to claims 1 to 10, characterized in that stripping agents are used.

12. The process pursuant to claims 1 to 11, characterized in that the outlet section comprises an underwater processing device.

13. The process pursuant to claims 1 to 12, characterized in that the fluid L is prepared by a process comprising at least the steps of

A) treating a fluid in at least one concentrator unit comprising at least a heater, a degassing vessel and a vapor line , whereby the fluid is heated, the heated fluid is fed into a degassing vessel where part of the volatile compounds are removed via the vapor line to obtain a concentrated fluid,

B) reheating the concentrated fluid from step A) in at least one reheating unit to obtain a concentrated fluid L.

14. The process pursuant to claims 1 to 13, characterized in that the fluid A or the fluid L is prepared by a process comprising at least the step of

pre A) treating a crude fluid (A) in at least one pre-washing unit comprising at least a separating apparatus (26), whereby the fluid (A) is mixed with water to obtain an organic phase (28) comprising primarily non-volatile polymer and volatile organic compounds and an aqueous phase (27) comprising primarily water and hydrophilic compounds, and whereby the organic phase (28) is separated from the aqueous phase (27) in a separating

apparatus (26) and further used as fluid (F) or directly as concentrated fluid L and whereby at least a part of the aqueous phase (27) is removed from the separating apparatus (fluid C).

15. The process pursuant to claims 1 to 14, characterized in that fluid A is prepared by a process comprising at least the step of

I) providing a reaction medium comprising

- a common aliphatic medium comprising at least 50 wt.-% of one or more aliphatic hydrocarbons having a boiling point in the range of 45°C to 80°C at a pressure of 1013 hPa, and
- a monomer mixture comprising at least one monoolefin monomer, at least one multiolefin monomer and either no or at least one other co-polymerizable monomer in a mass ratio of monomer mixture to common aliphatic medium of from 40:60 to 95:5, preferably from 50:50 to 85:15 and more preferably from 61:39 to 80:20;

II) polymerizing the monomer mixture within the reaction medium to form a rubber solution comprising a rubber polymer which is at least substantially dissolved in the medium comprising the common aliphatic medium and residual monomers of the monomer mixture;

III) separating residual monomers of the monomer mixture from the rubber solution to form a separated rubber solution comprising the rubber polymer and the common aliphatic medium,

IV) halogenating the rubber polymer in the separated rubber solution to obtain fluid A, a solution comprising the halogenated rubber and the common aliphatic medium,

16. The process pursuant to claim 15, characterized in that step IV) is performed using a bromination agent and the bromination agent is at least partially reoxidized using an oxidizing agent.

17. The use of extruders or kneaders in a process according to claims 1 to 16.

Claims

1. A process of removing volatile compounds from a concentrated fluid (L) containing 10 to 80 wt % of at least one halogenated butyl rubber and from 20 to 90 wt% of at least one volatile compound whereby the aforementioned components add up to 90 to 100 wt% of the total mass of the concentrated fluid (L) which comprises at least the step of:

   a) feeding a concentrated fluid into at least one drying unit, the drying unit comprising in flow direction at least

      I) a first drying section (8) and

      II) a main extruder section (9) comprising at least an

      - extruder degassing section comprising at least a conveying section and a vent port with one or more vapor lines,
      - an accumulating section and an outlet section,

      whereby volatile compounds are removed through the vent ports and vapor lines;

   whereby

   - the first drying section is either a kneader or a first extruder and the main extruder section is a main extruder or
   - the drying section and the main extruder section are both part of a main extruder, whereby the drying section is upstream the main extruder section and has a smaller cross section than the main extruder section and
   - the product obtained at the outlet section of the main extruder is substantially free of volatile compounds.

2. The process pursuant to claim 1, characterized in that the Fluid (F) contains from 3 to 50 wt % of halogenated butyl rubber and from 60 to 97 wt% volatile compounds, whereby the aforementioned components add up to 90 to 100 of the total mass of fluid (F).

3. The process pursuant to claims 1 or 2, characterized in that the first drying section is a first extruder and the main extruder section is a main extruder.

4. The process pursuant to anyone of claims 1 to 3, characterized in that the drying section and the main extruder section are both part of a main extruder, whereby the drying section is upstream the main extruder section and has a smaller cross section than the main extruder section.

5. The process pursuant to anyone of claim 4, characterized in that the main extruder has a larger cross sectional area than the first extruder.

6. The process pursuant to anyone of claims 1 to 5, characterized in that the vent ports (15) are designed to prevent the material from coming out of the vent ports.

7. The process pursuant to anyone of claim 4, characterized in that the vent ports (15)are equipped with stuffer screws.

8. The process pursuant to anyone of claims 4 to 7, characterized in that the main extruder is operated in such a manner that the dimensionless throughput $V/(n*d^3)$ is adjusted to from 0.01 to 0.7.

9. The process pursuant to anyone of claims 1 to 8, characterized in that stripping agents are used.

10. The process pursuant to anyone of claims 1 to 9, characterized in that the outlet section comprises an underwater processing device.

11. The process pursuant to anyone of claims 1 to 10, characterized in that the fluid L is prepared by a process comprising at least the steps of

A) treating a fluid in at least one concentrator unit comprising at least a heater, a degassing vessel and a vapor line , whereby the fluid is heated, the heated fluid is fed into a degassing vessel where part of the volatile compounds are removed via the vapor line to obtain a concentrated fluid,

B) reheating the concentrated fluid from step A) in at least one reheating unit to obtain a concentrated fluid L.

12. The process pursuant to anyone of claims 1 to 11, characterized in that the fluid A or the fluid L is prepared by a process comprising at least the step of

pre A) treating a crude fluid (A) in at least one pre-washing unit comprising at least a separating apparatus (26), whereby the fluid (A) is mixed with water to obtain an organic phase (28) comprising primarily halogenated butyl rubber and volatile organic compounds and an aqueous phase (27) comprising primarily water and hydrophilic compounds, and whereby the organic phase (28) is separated from the aqueous phase (27) in a separating apparatus (26) and further used as fluid (F) or directly as concentrated fluid L and whereby at least a part of the aqueous phase (27) is removed from the separating apparatus (fluid C).

13. The process pursuant to anyone of claims 1 to 12, characterized in that fluid A is prepared by a process comprising at least the step of

I) providing a reaction medium comprising

- a common aliphatic medium comprising at least 50 wt.-% of one or more aliphatic hydrocarbons having a boiling point in the range of 45°C to 80°C at a pressure of 1013 hPa, and
- a monomer mixture comprising at least one monoolefin monomer, at least one multiolefin monomer and either no or at least one other co-polymerizable monomer in a mass ratio of monomer mixture to common aliphatic medium of from 40:60 to 95:5, preferably from 50:50 to 85:15 and more preferably from 61:39 to 80:20;

II) polymerizing the monomer mixture within the reaction medium to form a rubber solution comprising a rubber polymer which is at least substantially dissolved in the medium comprising the common aliphatic medium and residual monomers of the monomer mixture;

III) separating residual monomers of the monomer mixture from the rubber solution to form a separated rubber solution comprising the rubber polymer and the common aliphatic medium,

IV) halogenating the rubber polymer in the separated rubber solution to obtain fluid A, a solution comprising the halogenated rubber and the common aliphatic medium,

14. The process pursuant to anyone of claim 13, characterized in that step IV) is performed using a bromination agent and the bromination agent is at least partially reoxidized using an oxidizing agent.

15. The use of extruders or kneaders in a process according to anyone of claims 1 to 14.