Claims

1. A method for producing halobutyl rubber by copolymerising isobutyl and isoprene in a solvent to butyl rubber, whereby the solvent may not be dissolvent for a suspension method or being dissolvent for a solution process, and subsequently halogenation of the butyl rubber, characterised in that at least the halogenation using a halogenating agent (8), especially with chlorine or bromine, occurs in a combination kneader (41), in which a copolymerisation zone (35) is separated from the halogenation zone (42) via a plug zone (37), whereas the halogenating agent (8) is added in the halogenation zone (42) and solvent vapours and possible acidic by-products (21), especially HCl and HBr, produced in the halogenation kneader (7) are removed.

2. A process according to claim 1, characterised by pre-concentration of the butyl rubber prior to halogenation for dry halogenation.

3. A process according to claim 1 or 2, characterised by addition of solvent to the halogenation kneader (7) to adjust the polymer concentration, to cool and to avoid granulation.

4. A process according to claim 3, characterised by addition of solvent (9) to the halogenation kneader (7) at several points distributed along the length.

5. A process according to at least one of the above mentioned claims, characterised by the addition of nitrogen (11) or another inert gas to the halogenation kneader (7).

6. A process according to at least one of the above mentioned claims, characterised by a further, final treatment of the product following halogenation, in a final-stage kneader.

7. A process according to claim 6, characterised by stripping of the product in the

final-stage kneader (14) with water (15), which is added to the final-stage kneader (14) at several points distributed along the length.

8. A process according to at least one of the above mentioned claims, characterised by halogenation preceded by a pre-concentration kneader (18), in which, particularly water, solvent and/or residual monomer (20) is removed from the butyl rubber.

9. A process according to at least one of the above mentioned claims, characterised by placing the butyl rubber in a solvent prior to halogenation and removing this prior to halogenation.

10. A process according to claim 9, characterised by mixing of the butyl rubber in a solvent tank (26) and/or pre-concentration kneader (18.3) with hot solvent.

11. A process according to claim 10, in which the solvent tank (26) is at least followed by a pre-concentration kneader (18.1), in which the product is concentrated.

12. A process according to at least one of claims 9-11, characterised by the use of hot hexane as a solvent.

13. A process according to claim 12, characterised by the removal of residual monomers and chloromethane, isopentane or hexane from the solvent tank (26) and/or at least from a following pre-concentration kneader (18.1, 18.3).

14. A process according to at least one of the above mentioned claims, characterised by the production of butyl rubber in a copolymerisation kneader (29).

15. A process according to claim 14, characterised by the use of a pre-concentration kneader (18) for concentration between the copolymerisation kneader (29) and the halogenation kneader (7).

16. A process according to claim 14 or 15, characterised by the occurrence of both

copolymerisation (35) and concentration (26) in a combination kneader (34).

17. A process according to at least one of claims 14-16, characterised by the occurrence of copolymerisation and halogenation in a combination kneader (41).

18. A process according to claim 16 or 17, characterised by the separation of the two zones (35, 36, 42) for copolymerisation and concentration or halogenation.

19. A process according to claim 18, characterised by the separation of two zones (35, 36, 42) by influencing the flow of the product.

20. A process according to claim 18 or 19, characterised by the separation of the two zones (35, 36, 42) by mechanical installations in the kneaders.

21. A process according to at least one of the above mentioned claims, characterised by heating of the product before and/or after each kneader.

22. Apparatus for carrying out the process according to at least one of the abovementioned claims, characterised by the use of a halogenation zone (42) following a copolymerisation zone (35) for the production of butyl rubber, separated via a plug zone (37) and by an addition (8) of a halogenating agent in the halogenation zone (42).

23. Apparatus according to claim 22, characterised in that the halogenation kneader (7) is followed by a final-stage kneader (14).

24. Apparatus according to claim 22 or 23, characterised by at least a pre-concentration kneader (18-18.3) prior to the halogenation kneader (7).

25. Apparatus according to at least one of claims 22 - 24, characterised by the copolymerisation of butyl rubber in a copolymerisation kneader (29).

26. Apparatus according to at least one of the above mentioned claims, characterised by copolymerisation and pre-concentration in a combination kneader

(34).

27. Apparatus according to at least one of the above mentioned claims, characterised by copolymerisation and halogenation in a combination kneader (41).

28. Apparatus according to at least one of the above mentioned claims, characterised by the connection between two kneaders with a single or twin-shaft feeding device, where an optional gear pump presses the pasty polymer in an optionally heated connecting tube/connecting heat-exchanger to the following continuous flow device.