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Patent literature 7: Japanese patent Laid-Open Publication No. 2012-064556

Patent literature 8: Japanese patent Laid-Open Publication No. 2011-246660

Patent literature 9: Japanese patent Laid-Open Publication No. 2012-092286

Patent literature 10: Japanese patent Laid-Open Publication No. 2012-092287

Patent literature 11: Japanese patent Laid-Open Publication

Summary

[0010a]

In one aspect of the present disclosure, there is provided a microporous film comprising a polypropylene, wherein the polypropylene satisfies the following requirements (1) and (2):

(1) a weight-average molecular weight (Mw) value, as determined by gel permeation chromatography (GPC), being not less than 100,000 but less than 800,000, a Mw/Mn value obtained by dividing the weight-average molecular weight by the number-average molecular weight being more than 7.0 but not more than 12.0, and a Mz/Mw value obtained by dividing the Z-average molecular weight by the weight-average molecular weight being not less than 3.8 but not more than 9.0, and

(2) a mesopentad fraction not less than 95.5%, as measured by ^{13}C-NMR (nuclear magnetic resonance method).

[0010b]

In another aspect of the present disclosure, there is provided a separator comprising the microporous film disclosed herein.

[0010c]

In a further aspect of the present disclosure, there is provided a filtration film comprising the microporous film disclosed herein.

[0010d]

In another aspect of the present disclosure, there is provided a separation membrane comprising the microporous film disclosed herein.

[0010e]

In a further aspect of the present disclosure, there is provided a separator used in a battery comprising the microporous film disclosed herein.

[0010f]

In another aspect of the present disclosure, there is provided a separator used in a condenser comprising the microporous film disclosed herein.

[0010g]

In a further aspect of the present disclosure, there is provided a process for producing a microporous film comprising a polypropylene disclosed herein, comprising preparing a raw fabric film of the polypropylene, carrying out a cold stretching step of stretching the thus prepared raw fabric film at a temperature of not lower than 0°C but lower than 100°C and carrying out a hot stretching step of stretching the thus cold-stretched film at a temperature of not lower than 100°C but lower than 170°C.

Technical Problem

[0011]

It is an object of the present disclosure to provide polypropylene for a microporous film which has wide-ranged condition of raw fabric film preparation and raw fabric film stretching and has an excellent balance between film strength and permeability, and uses of the polypropylene.

Solution to Problem

[0012]

The present disclosure provides the following [1] to [14].

used for medical purposes.

[0022]

[13] The separation membrane as stated in the above [8], which is used for medical purposes.

[0023]

[14] A process for producing a microporous film, comprising preparing a raw fabric film of the polypropylene for a microporous film as stated in any one of the above [1] to [4], carrying out a cold stretching step of stretching the thus prepared raw fabric film at a temperature of not lower than 0°C but lower than 100°C and than carrying out a hot stretching step of stretching the thus cold-stretched film at a temperature of not lower than 100°C but lower than 170°C.

Advantageous Effects

[0024]

The polypropylene for a microporous film of the present disclosure contains an ultrahigh-molecular weight component while having an appropriate molecular weight distribution, and has high regularity. Therefore, by the use of this polypropylene as a raw material, a raw fabric film which has highly controlled crystal structure (orientation and crystal size), has few defects such as fish eyes and granules and is excellent in thickness accuracy is obtained. Further, when the raw fabric film is stretched in the next

Claims:

1. A microporous film comprising a polypropylene, wherein the polypropylene satisfies the following requirements (1) and (2):

(1) a weight-average molecular weight (Mw) value, as determined by gel permeation chromatography (GPC), being not less than 100,000 but less than 800,000, a Mw/Mn value obtained by dividing the weight-average molecular weight by the number-average molecular weight being more than 7.0 but not more than 12.0, and a Mz/Mw value obtained by dividing the Z-average molecular weight by the weight-average molecular weight being not less than 3.8 but not more than 9.0, and

(2) a mesopentad fraction not less than 95.5%, as measured by ^{13}C-NMR (nuclear magnetic resonance method).

2. The microporous film as claimed in claim 1, which satisfies the following requirement (3):

(3) a Cl content not more than 5.0 ppm.

3. The microporous film as claimed in claim 1 or 2, which satisfies the following requirement (4):

(4) an amount of a xylene-soluble portion (CXS) not more than 5.0% at 23°C.

4. The microporous film as claimed in

any one of claims 1 to 3, wherein the polypropylene has a molecular weight of not less than 7,000,000 in an amount of not less than 0.3% but not more than 1.5%.

5. A separator comprising the microporous film as claimed in any one of claims 1 to 4.

6. A filtration film comprising the microporous film as claimed in any one of claims 1 to 4.

7. A separation membrane comprising the microporous film as claimed in any one of claims 1 to 4.

8. A separator used in a battery comprising the microporous film as claimed in any one of claims 1 to 4.

9. A separator used in a condenser comprising the microporous film as claimed in any one of claims 1 to 4.

10. The separator as claimed in claim 8, which is used in a lithium ion secondary battery.

11. The filtration film as claimed in claim 6, which is used for medical purposes.

12. The separation membrane as claimed in claim 7, which is used for medical purposes.

13. A process for producing a microporous film comprising a polypropylene as claimed in any one of claims 1 to 4, comprising preparing a raw fabric film of the polypropylene, carrying out a cold stretching step of stretching the thus prepared raw fabric film at a temperature of not lower than 0°C but lower than 100°C and carrying out a hot stretching step of stretching the thus cold-stretched film at a temperature of not lower than 100°C but lower than 170°C.