A melt-blown nonwoven fabric of the present invention is formed from an ethylene-\(\text{-(meth)acrylic acid copolymer having a melt flow rate of 50 to 1000 g/10 min measured at 216 kg load and at a temperature of 190\degree \text{C.}}\) in accordance with ASTM D1238, and a content of acrylic acid or methacrylic acid unit of 2 to 25 weight %. The nonwoven fabric has the sum of values of (tensile strength (g/5 cm))/(basis weight (g/m²)) in machine direction and cross direction of 30 to 100, and a residual strain after 50% extension of no more than 20%, and is excellent in gas permeability, elasticity and moreover moderate strength. The nonwoven fabric is suitable for elasticized fabric components, packaging materials, laminates, etc.
MELT-BLOWN NONWOVEN FABRIC

TECHNICAL FIELD

[0001] The present invention relates to a melt-blown nonwoven fabric, and particularly to a melt-blown nonwoven fabric suitable for elasticized fabric components, packaging materials, laminates, etc. having outstanding gas permeability, elasticity as well as moderate strength.

BACKGROUND ART

[0002] In recent years, nonwoven fabrics have been used for various kinds of applications, and their applications have also been expanding. And demands for various characteristics are now increasing in accordance with the uses. For example, excellent elasticity with outstanding gas permeability is required, based on the parts used, in nonwoven fabrics used for gathers of disposable diapers, a part of medical supplies, such as sanitary napkins, base cloths of wet compress, etc. Moreover, moderate strength is also required in them upon their processing and molding processes.

[0003] Porous films of polyvinyl chloride are conventionally used as materials such as pouliche medicine base cloths etc. that are attached to a human body using elasticity. However, these materials induce a problem of dioxin generation when they are wasted and burned. Although polyurethane melt-blown nonwoven fabrics are provided into market as a replacement of polyvinyl chloride, this material is expensive and also has a problem of harmful gas generation at the time of combustion.

[0004] For these reasons, a melt-blown nonwoven fabric that has a moderate strength while having outstanding gas permeability and elasticity and is made from a material with little environmental burden has been required. A melt-blown nonwoven fabric excellent in printability, low-temperature heat seal property and hot tack property has also been required.

[0005] An objective of the present invention is to provide a melt-blown nonwoven fabric that gives little burden on the environment while having outstanding gas permeability and elasticity as well as moderate strength, and that is comparatively economical and advantageous in cost. Moreover, the other objective of the present invention is to provide a melt-blown nonwoven fabric excellent in printability, low-temperature heat, seal property and hot tack property.

DISCLOSURE OF THE INVENTION

[0006] As a result of wholehearted examination made by the present inventors in order to solve the above-mentioned problems, it was found out that a melt-blown nonwoven fabric made from ethylene-(meth)acrylic acid copolymers solves above described problems, and the present invention was attained. In the present invention, (meth)acrylic acid represents acrylic acid or methacrylic acid, and ethylene-(meth)acrylic acid copolymers represent ethylene-acrylic acid copolymers or ethylene-methacrylic acid copolymers.

[0007] That is, according to the present invention, a melt-blown nonwoven fabric made from ethylene-(meth)acrylic acid copolymers is provided.

[0008] In a preferred embodiment of the above-mentioned ethylene-(meth)acrylic acid copolymers, the copolymers preferably have a melt flow rate of 50 to 1000 g/10 min measured at 216 kg load and at a temperature of 190°C. in accordance with ASTM D1238, and 2 to 25 weight % of (meth)acrylic acid unit content.

[0009] In a preferred embodiment of the above-mentioned melt-blown nonwoven fabric, the sum of values of tensile strength (g/5 cm), basis weight (g/m²) in machine direction and cross direction is preferably 30 to 100, and tensile elongation in machine direction and cross direction is 80% or higher each.

[0010] Moreover, in a preferred embodiment of the above-mentioned melt-blown nonwoven fabric, a residual strain after 50% extension is preferably 20% or less, and a residual strain after 100% extension is no more than 50%.

[0011] An elasticized fabric component and packaging material comprising the above-mentioned melt-blown nonwoven fabric, and a nonwoven fabric laminate having at least one layer of the above-mentioned melt-blown nonwoven fabric are provided by the present invention.

[0012] A manufacturing method of the above-mentioned melt-blown nonwoven fabric is preferably a melt-blowing method in which ethylene-(meth)acrylic acid copolymer is directly extruded from melt-blowing dies located in a line into two flows of high-speed, high-temperature converging air streams, and then the molten copolymer is drawn, made finer and collected onto a conveying screen. In this process air flow per 1 kg of above-mentioned copolymer is preferably 10 to 200 Nm² and a distance from melt-blowing dies to a collection screen is preferably 10 to 40 cm.

BEST MODE FOR CARRYING OUT THE INVENTION

[0013] A description about a melt-blown nonwoven fabric of the present invention and its manufacturing method will concretely be given hereinafter.

[0014] A melt-blown nonwoven fabric (henceforth, referred to as a melt-blown nonwoven fabric of the present invention) of the present invention is made from ethylene-(meth)acrylic acid copolymers.

[0015] The ethylene-(meth)acrylic acid copolymers are copolymers in which ethylene is copolymerized with acrylic acid or methacrylic acid and, if necessary, further unsaturated carboxylic acid esters by a well-known radical polymerization method etc., and contain a unit of acrylic acid or methacrylic acid of preferably 2 to 25 weight %, more preferably 5 to 20 weight % and more preferably 10 to 15 weight % in a polymer. When a content of acrylic acid or methacrylic acid unit is in this range, good touch and flexibility as well as good elasticity, chemical resistance, solvent resistance, hot tack property, heat seal property, and printability, and also an advantage in cost are obtained. Moreover, an extrusion temperature in the range of from 160 to 280°C is suitable, and it has an advantage that the ethylene-(meth)acrylic acid copolymers may be extruded at a higher temperature (e.g. 240°C or more) than ethylenevinyl acetate copolymers.

[0016] Besides, if an unsaturated carboxylic acid ester unit exists in the ethylene-(meth)acrylic acid copolymers, it improves flexibility, and its content usually ranges 0 to 25 weight %, and preferably 0 to 15 weight %, and more
preferably 0 to 10 weight%. As unsaturated carboxylic acid esters, alkyl esters with 1 to 8 carbons of (meth)acrylic acid are preferable, and, specifically, methyl acrylate, methyl methacrylate, ethyl acrylate, ethyl methacrylate, iso-propyl acrylate, iso-propyl methacrylate, n-butyl acrylate, n-butyl methacrylate, iso-butyl acrylate, iso-butyl methacrylate, 2-ethylhexyl acrylate, and 2-ethylhexyl methacrylate etc. may be mentioned.

[0017] Besides, a melt flow rate (MFR) of the ethylene-(meth)acrylic acid copolymers, measured under the conditions of 2.16 kg load at a temperature of 190°C, in accordance with ASTM D1238 is preferably 50 to 1000 g/10 min, more preferably 100 to 500 g/10 min. If an MFR value is within the range, a phenomenon of generating of scattering of fiber waste (fly) and resin lump (shot) that often pose problems in melt-blowing methods is hardly observed, and it becomes easy to make fibers finer.

[0018] In the present invention in order to improve tensile elongation of a melt-blown nonwoven fabric, thermoplastic polymers selected from ethylene-a-olefin random copolymers, ethylene-vinyl acetate copolymers, ethylene-(meth)acrylate copolymers, styrene-conjugated diene-styrene block copolymers and hydrogenated styrene-conjugated diene-styrene block copolymers may be blended to ethylene-(meth)acrylic acid copolymers. These thermoplastic polymers may be blended in an amount of 0 to 100 weight parts, preferably 0 to 40 weight parts, more preferably 0 to 10 weight parts to ethylene-(meth)acrylic acid copolymers of 100 weight parts.

[0019] In the above-mentioned ethylene-a-olefin random copolymers, it is preferable to use copolymers with a density of 870 to 940 kg/m³ and especially of 880 to 930 kg/m³. Besides, as α-olefins in the copolymers, α-olefins with 3 to 12 carbons, such as propylene, 1-butene, 1-pentene, 1-hexene, 1-octene, 1-decene, 1-dodecene, and 4-methyl-1-pentene may be mentioned. Such ethylene-α-olefin random copolymers may be manufactured with single-site catalysts or with multi-site catalysts.

[0020] As the above-mentioned ethylene-vinyl acetate copolymers, vinyl acetate unit is preferably 5 to 40 weight %, and especially preferably 10 to 30 weight %. Besides, as the above-mentioned ethylene-(meth)acrylic acid copolymers, (meth)acrylic acid ester unit is preferably 5 to 40 weight %, and especially preferably 10 to 30 weight %. What is already mentioned may be used here as (meth)acrylic acid esters. These copolymers may be obtained by a radical copolymerization under a condition of high temperature and high pressure.

[0021] As the above-mentioned ethylene-α-olefin copolymers, ethylene-vinyl acetate copolymers and ethylene-(meth) acrylate copolymers, an MFR based on 190°C and 2.16 kg load of 1 to 100 g/10 min are preferable, and that of 10 to 500 g/10 min are more preferable.

[0022] As conjugated dienes in the above-mentioned styrene-conjugated diene-styrene block copolymers, and hydrogenated copolymers of them, butadiene or isoprene is preferable. Besides, in styrene-conjugated diene-styrene block copolymers, conjugated dienes are polymerized by 1,2-polymerization, 1,4-polymerization, 3,4-polymerization, or by polymerization in the combination of these polymerizations. In the copolymers, a styrene unit preferably accounts for the range of 8 to 50 weight %, especially 10 to 40 weight %. Besides, in the above-mentioned hydrogenated polymers, conjugated diene units are preferably hydrogenated by 70% or more, more preferably by 90% or more. As styrene-conjugated diene-styrene block copolymers, and their hydrogenated copolymers, copolymers that have an MFR at 230°C and 2.16 kg load of 1 to 200 g/10 min are preferably used, and that have an MFR of 2 to 100 g/100 min are more preferably used.

[0023] In the present invention, other resins may be added to the above-mentioned ethylene-(meth)acrylic acid copolymers and the above-mentioned thermoplastic polymers needed to be blended, in a range in which the objectives of the present invention are not impaired. As other resins that may be added, for example, polyethylene (high pressure low density polyethylene, middle or high-density polyethylene, etc.), polypropylenes (homopolymers, random copolymers and block copolymers with other α-olefins), polyethylene terephthalates, polyester elastomers, polyamides (nylon), polyurethanes, polyvinyl alcohol, ethylene-(meth)acrylic acid copolymer ionomers, and polystyrenes etc. may be mentioned.

[0024] In the present invention, pigments, heat stabilizers, lubricants, nuclear agents, etc. may be blended into the above-mentioned ethylene-(meth)acrylic acid copolymers in a range in which the objective of the present invention are not impaired.

[0025] A melt-blown nonwoven fabric made from the above-mentioned ethylene-(meth)acrylic acid copolymers can be made by a conventional melt-blowing method where ethylene-(meth)acrylic acid copolymer is directly extruded from melt-blowing dies located in a line into two flows of high-speed, high-temperature converging air streams and then the molten copolymer is drawn, made finer and collected onto a conveying screen.

[0026] In this case, air flow per 1 kg of the above-mentioned copolymer is 10 to 200 Nm² and more preferably 20 to 150 Nm². If the amount of air flow in this range is used, the diameter of fiber becomes moderately small and an aggravation of physical properties does not happen. In addition, a fly phenomenon that often occurs when air flow is excessive is not observed, and troubles in production may be avoided.

[0027] Moreover, the distance from the melt-blowing dies to the collective screen is preferably 10 to 40 cm, and more preferably 15 to 25 cm. If this distance is within this range, a surface of nonwoven fabric becomes smooth, and a poor appearance caused by fiber bundles is avoidable. Moreover, tensile strength reaches a satisfactory level.

[0028] Furthermore, a nonwoven fabric web formed by the melt-blowing method is preferably thermal-bonded in parts by emboss processing. When emboss processing is carried with the embossed part in perfect molten state, a thermal-bonded area (equivalent to stamping area of the embossing roll) is preferably 1 to 50% of the overall nonwoven fabric area, and when emboss processing is carried out with the embossed part in half-molten state (to maintain fiber shape), a thermal-bonded area is preferably 10 to 100% of the overall nonwoven fabric area. If a percentage of thermal-bonded area is in this range, soft touch of melt-blown nonwoven fabric is maintained and tensile strength and abrasion resistance are improved.
[0029] A basis weight of a melt-blown nonwoven fabric of the present invention obtained as mentioned above is preferably 5 to 200 g/m², and more preferably 30 to 100 g/m². Moreover, an average diameter of fiber of a melt-blown nonwoven fabric is preferably 5 to 20 micrometers.

[0030] A description about tensile characteristics of a melt-blown nonwoven fabric of the present invention is given below.

[0031] The sum of values of (tensile strength)/(basis weight) obtained by dividing tensile strength (g/5 cm) by basis weight (g/m²) of nonwoven fabric in machine direction and in cross direction is preferably 30 to 100, more preferably 50 to 100.

[0032] Tensile elongation in each of machine direction and cross direction is preferably 80% or more, and more preferably 100% or more.


[0034] Moreover, in machine direction and cross direction, a residual strain after 50% extension is preferably 20% or less, more preferably 15% or less, and a residual strain after 100% extension is preferably 50% or less, and more preferably 35% or less. A residual strain after extension here means a percentage of a length of a sample extended to an original length of the sample, in which a nonwoven fabric sample is elongated to a predetermined elongation and immediately returned to the original position at the same elongation/shrinking speeds.

[0035] Since a melt-blown nonwoven fabric of the present invention has such tensile characteristics as well as excellent elasticity and gas permeability, and moderate strength, it is extremely excellent as a nonwoven fabric for elasticized fabric components, and can be used as a base cloth for plasters, wet compress and poultice medicines etc.; body personal protective equipments such as supporters, sacks, and bandages; elastic components for surgical goods of masks, caps, shoe covers, etc.; elastic components for health goods of disposable diapers, sanitary napkins, etc. A melt-blown nonwoven fabric of the present invention may also be used as packaging materials such as; for example, gas permeable packaging materials for insecticides/fungicides, deodorants/odorants, oxygen absorbing agents, chemical body warmers, perfumes, sweets, and fruits; packaging materials for medical goods (syringes etc.) sterilizable with glycerol; or water permeable packaging materials for tea, green tea, coffee, agricultural chemicals, water pigment, and ink.

[0036] Furthermore, since a melt-blown nonwoven fabric of the present invention has flexibility, good chemical resistance, solvent resistance, and touch, moderate strength and an outstanding printability, it may suitably be used as a nonwoven fabric laminate that has at least one layer of the melt-blown nonwoven fabrics. Specifically, the laminates can be used for disposable garments (under wears, work wears, surgical gowns and masks), and interior materials for curtains and tablecloths. In such laminates, various films, textiles, nonwoven fabrics, cotton cloths, nets, tallies, synthetic paper, etc. may be selected as materials to make laminates with a melt-blown nonwoven fabric of the present invention.

[0037] Specifically, they are films of thermoplastic polymers such as olefin polymers like polyethylene, polypropylene, poly-4-methyl-1-pentene, ethylene-vinyl acetate copolymers, or polyesters and polyamides, and textiles, nonwoven fabrics, cotton cloths, nets, tallies, synthetic paper, etc. which are comprised from fibers of above-mentioned thermoplastic polymers, regenerated fibers and/or natural fibers. The above-mentioned films may or may not be oriented, and moreover, may be non-porous films or porous films. Moreover, the above-mentioned nonwoven fabric obtained by various methods may be used. For example, a nonwoven fabric manufactured by methods, such as spin-bonding method, melt-blowing method, dry process method, and wet process method, may be used.

EXAMPLES

[0038] Hereinafter, although a description of the present invention is given in detail by referring to Examples, the present invention is not limited to these Examples.

[0039] Measurements of a ratio of (tensile strength)/(basis weight), tensile elongation, a residual strain after extension, and the diameter of a fiber, evaluations of appearance, touch, strength of hot tack and heat seal strength in the following Examples were performed according to the following methods.

[0040] (1) (Tensile Strength)/(Basis Weight) and Tensile Elongation

[0041] A nonwoven fabric specimen with a width of 5 cm was held in 100 mm of distance between chuck of a tension tester and tensile test was performed under a condition of elongation speed of 100 mm/min at room temperature. Maximum strength (g) obtained by this test was defined as tensile strength (g/5 cm), and maximum elongation was defined as tensile elongation. Measurement was performed in two directions of machine direction (MD) and cross direction (CD). A value of tensile strength in each direction was divided by basis weight (g/m²) of nonwoven fabric specimen and a value of (tensile strength)/(basis weight) was calculated.

[0042] (2) Residual Strain after Extension

[0043] A nonwoven fabric specimen with a width of 5 cm was held in 100 mm of distance between chuck of the tension tester as described in the tensile test, under a condition of elongation speed of 100 mm/min at room temperature. The specimen was elongated up to 50% or 100%, and then returned at the same elongation/shrinking speed to a point where the stress reached 0. The percentage of a length of the specimen elongated and that of relaxed was defined as a residual strain. Measurement was performed in two directions of machine direction (MD) and cross direction (CD).

[0044] (3) Diameter of a Fiber

[0045] The diameter of fiber was an average of 30 fibers selected at random where each measurement was done using photographs of x500 magnification by an electron microscope.
Visual observation of the nonwoven fabric was carried out, and existence of fiber bundle was evaluated. A mark of □ was given when no fiber bundle was observed, and x was given when fiber bundle was clearly observed.

A sensory evaluation by 10 panels was performed. Nonwoven fabric sample was touched to skin of evaluators, and the skin was rubbed lightly with the sample. A mark of □ was given when seven or more panels judged that the sample had a smooth touch and no coarse touch, and x was given when other evaluation was given.

After a sample was heat sealed with heat seal pressure of 0.28 MPa and for heat seal time of one second, hot-tack strength was determined as the peel strength at a rate of 1000 mm/min after 0.375 seconds of the one second heat seal.

A after a sample was heat sealed by one side heating with heat seal pressure of 0.2 MPa and for heat seal time of 2 seconds, heat seal strength was determined as the peel strength at a rate of 300 mm/min.

An ethylene-methacrylic acid copolymer (MFR: 100 g/10 min, measured at 216 kg load and at temperature of 190°C based on ASTM D1238 (the following MFR measurement uses the same conditions), methacrylic acid unit content: 11 weight %) was melted in an extruder at an extrusion temperature of 250°C. The obtained molten material was extruded into high-speed, high-temperature air stream through the melt-blowing dies, and collected on the collecting screen, and thus a melt-blown nonwoven fabric of 13 micrometers in diameter of a fiber and a basis weight of 40 g/m² was manufactured. At this time, an amount of air flow per 1 kg of above-mentioned copolymer was 65 Nm³, and the distance (collection distance) from the melt-blowing dies to the collection screen was 25 cm.

Measurement and evaluation results of the obtained melt-blown nonwoven fabric are shown in Table 1.

A melt-blown nonwoven fabric of 12 micrometers in diameter of a fiber and a basis weight of 40 g/m² was manufactured as in Example 1 except the change of the amount of air flow per 1 kg of copolymer to 120 Nm³.

Measurement and evaluation results of the obtained melt-blown nonwoven fabric are shown in Table 1.

An ethylene-methacrylic acid copolymer (MFR: 300 g/10 min, methacrylic acid unit content: 20 weight %) was melted in the extruder at an extrusion temperature of 190°C. Obtained molten material was extruded into high-speed, high-temperature air stream through the melt-blowing dies, and collected on the collecting screen, and thus a melt-blown nonwoven fabric of 8 micrometers in diameter of a fiber and a basis weight of 40 g/m² was manufactured. At this time, the amount of air flow per 1 kg of above-mentioned copolymer was 120 Nm³, and the distance (collection distance) from the melt-blowing dies to the collection screen was 25 cm.

Measurement and evaluation results of the obtained melt-blown nonwoven fabric are shown in Table 1.
methacrylic acid copolymer obtained exhibits an outstanding hot tack property and low-temperature heat seal property, and therefore, is useful as an inner layer of packaging bags which are heat sealed.

**COMPARATIVE EXAMPLES 1, 2**

[0065] The melt-blown nonwoven fabric (basis weight 40 g/m²) made from ethylene-methacrylic acid copolymer in Example 5 was replaced with a polypropylene melt-blown nonwoven fabric (Mitsui Chemicals Co., LTD. SYNTAX V3040 NIE) of basis weight 40 g/m², or a polypropylene spun-bonded nonwoven fabric. (Mitsui Chemicals SYNTAX PS-108) of basis weight 40 g/m², and the two fabrics were adhered onto an OPP film as in Example 5. Hot tack and heat seal strength of each nonwoven fabric face were measured. Results are shown in Table 2 and Table 3, respectively.

[0066] As shown in Tables, the melt-blown nonwoven fabric of polypropylene and the spun-bonded nonwoven fabric of polypropylene are inferior to the melt-blown nonwoven fabric of ethylene-methacrylic acid copolymer, as an inner layer of packaging bags to be heat sealed.

### TABLE 2

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Hot tack strength (N/25 mm)</th>
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<tbody>
<tr>
<td>temperature (°C)</td>
<td>Example 5</td>
</tr>
<tr>
<td>90</td>
<td>1.2</td>
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<td>100</td>
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<td>150</td>
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<tr>
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<td>0.1</td>
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</table>

### TABLE 3

<table>
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<tr>
<th>Measurement</th>
<th>Heat seal strength (N/25 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>temperature (°C)</td>
<td>Example 5</td>
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<td>150</td>
<td>—</td>
</tr>
<tr>
<td>160</td>
<td>0.1</td>
</tr>
</tbody>
</table>

**EXAMPLE 6**

[0068] A melt-blown nonwoven fabric (MB) of ethylene-methacrylic acid copolymer (10 g/m²) was prepared as in Example 1, except the change of the amount of air flow per 1 kg of copolymer to 150 Nm², and a basis weight is adjusted to 10 g/m² in Example 1. This melt-blown nonwoven fabric was laminated with a spun-bonded nonwoven fabric (PE SB) made from polyethylene of basis weight of 30 g m² (STRAMIGHTY MN made by Idemitsu Petrochemical Co., LTD) by an embossing roll at 70° C. Evaluation of touch of the face of the ethylene-methacrylic acid copolymer melt-blown nonwoven fabric in this laminate was performed. Result is shown in Table 4. Moreover, surface tension of this nonwoven fabric face was measured in order to determine printing characteristics. The result is also shown in Table 4.

[0069] These evaluations show that a nonwoven fabric of being excellent in touch, wettability, and printability may be obtained by the use of melt-blown nonwoven fabric made from ethylene-methacrylic acid copolymer in one layer of nonwoven fabric laminates.

**COMPARATIVE EXAMPLES 3 and 4**

[0070] Results of evaluation of touch and surface tension for a spun-bonded nonwoven fabric (PE SB) made from polyethylene of basis weight 30 g/m² (STRAMIGHTY MN made by Idemitsu Petrochemical Co., LTD), and a propylene spun-bonded nonwoven fabric (PP MB) (Mitsui Chemicals Co., LTD. SYNTAX PS-108) of basis weight 40 g/m² are shown in Table 4.

**EXAMPLE 7**

[0071] Ethylene-1-butene random copolymer (Mitsui Chemicals, Inc. Tafmer A70090, density 890 kg/m³) 20 weight % was dry blended with ethylene-methacrylic acid copolymer (MER: 500 g/10 min, methacrylic acid unit content: 10 weight %) 80 weight %, and melt blended in an extruder. The molten mixture obtained was extruded into high-speed, high-temperature air stream from the melt-blowing dies, and collected on the screen to manufacture a melt-blown nonwoven fabric of 12 micrometers in diameter of a fiber and a basis weight of 40 g/m². At this time, the amount of air flow per 1 kg of the resin was 27 Nm², and the distance from the melt-blowing dies to the collection screen 15 was 15 cm.

**EXAMPLE 8**

[0073] A melt-blown nonwoven fabric with 13 micrometers in diameter of a fiber and a basis weight of 40 g/m² was manufactured by the same method as Example 7, except the change of using the ethylene-methacrylic acid copolymer of Example 7 by 80 weight %, and a hydrogenated styrene-butadiene-styrene block copolymer (Asahi Kasei Corporation, Tuftec H1031) by 20weight %, and the change of the amount of spinning air flow to 44 Nm³ per 1 kg of the blend. Measurement and evaluation results of the obtained melt-blown nonwoven fabric are shown in Table 5.

**EXAMPLE 9**

[0074] A melt-blown nonwoven fabric with 10 micrometers in diameter of a fiber and a basis weight of 40 g/m² was
manufactured by the same method as Example 7, except the change of using 80 weight % of the ethylene-methacrylic acid copolymer of Example 7 and 20 weight % of an ethylene-vinyl acetate copolymer (Du Pont-Mitsui Polychemicals Co., Ltd., EVAFLEX V577), and the change of the amount of spinning air flow to 15 Nm³ per 1 kg of the blend.

[0075] Measurement and evaluation results of the obtained melt-blown nonwoven fabric are shown in Table 5.

EXAMPLE 10

[0076] A melt-blown nonwoven fabric with 11 micrometers in diameter of a fiber and a basis weight of 40 g/m² was manufactured by the same method as Example 7, except the change of using 80 weight % of the ethylene-methacrylic acid copolymer of Example 7, and 20 weight % of an ethylene-ethyl acrylate copolymer (MFR: 275 g/10 min, ethyl acrylate unit content: 25 weight %), and the change of the amount of spinning air flow to 27 Nm³ per 1 kg of the blend.

[0077] Measurement and evaluation results of the obtained melt-blown nonwoven fabric are shown in Table 5.

<table>
<thead>
<tr>
<th>Example</th>
<th>Tensile strength (MD)/basis (CD)</th>
<th>Tensile elongation (MD/CD) %</th>
<th>Residual strain after 100% extension (MD/CD) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>23/17</td>
<td>205/220</td>
<td>28/28</td>
</tr>
<tr>
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<td>23/39</td>
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<td>28/26</td>
</tr>
<tr>
<td>9</td>
<td>21/16</td>
<td>210/200</td>
<td>30/30</td>
</tr>
<tr>
<td>10</td>
<td>21/17</td>
<td>200/205</td>
<td>28/28</td>
</tr>
</tbody>
</table>

[0080] Moreover, a melt-blown nonwoven fabric of the present invention does not usually cause a problem of harmful gas generation when it is wasted and burned, and therefore, has little burden on the environment.

1. A melt-blown nonwoven fabric formed from an ethylene-(meth)acrylic acid copolymer.

2. The melt-blown nonwoven fabric of claim 1, wherein said ethylene (meth)acrylate copolymers is blended with a thermoplastic polymer selected from ethylene-α-olefin random copolymers, ethylene-vinyl acetate copolymers, ethylene-(meth)acrylate copolymers, styrene-conjugated diene-styrene block copolymers and hydrogenated styrene-conjugated diene-styrene block copolymers.

3. The melt-blown nonwoven fabric of claim 1, wherein said ethylene-(meth)acrylate copolymers is blended with a thermoplastic polymer selected from ethylene-α-olefin random copolymers, ethylene-vinyl acetate copolymers, ethylene-(meth)acrylate copolymers, styrene-conjugated diene-styrene block copolymers and hydrogenated styrene-conjugated diene-styrene block copolymers.

4. The melt-blown nonwoven fabric of claim 1, wherein the sum of values of (tensile strength (g/5 cm)) (basis weight (g/m²)) in machine direction and cross direction is in the range of from 30 to 100, and each of tensile elongation in the machine direction and the cross direction is 80% or more.

5. The melt-blown nonwoven fabric of claim 1, wherein a residual strain after 50% extension is 20% or less, and a residual strain after 100% extension is 50% or less.

6. The melt-blown nonwoven fabric of claim 1, wherein a basis weight is in the range of from 5 to 200 g/m².

7. The melt-blown nonwoven fabric of claim 1, wherein said melt-blown nonwoven fabric is embossed.

8. An elasticized fabric component characterized by comprising a melt-blown nonwoven fabric according to any one of claims 1 to 7.

9. A packaging material characterized by comprising a melt-blown nonwoven fabric according to any one of claims 1 to 7.

10. A nonwoven fabric laminate characterized by comprising at least one layer of a melt-blown nonwoven fabric according to any one of claims 1 to 7.

11. A method of manufacturing the melt-blown nonwoven fabric of claims 1 to 7, in which an ethylene-(meth)acrylic acid copolymer is melted in an extruder, directly extruded from melt-blowing dies located in a line into two flows of high-speed, high-temperature converging air streams, and then the molten copolymer is drawn, made finer and collected onto a conveying screen, wherein an amount of air flow per one kilogram of said copolymer in the range of from 10 to 200 Nm³ and a distance from melt-blowing dies to a collective screen is in the range of from 10 to 40 cm.

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**Industrial Applicability**

[0079] Since a melt-blown nonwoven fabric of the present invention is excellent in elasticity, gas permeability and moderate strength, it is excellent as nonwoven fabric for elasticized fabric components, and can preferably be applicable for base cloths for adhesive bandages, fomentation poultice; supporters, sacks, bandages; surgical masks, caps, shoe covers; disposable diapers, sanitary napkins, etc. A melt-blown nonwoven fabric of the present invention can also be applicable for packaging materials and nonwoven fabric laminates.