

SPECIFICATION

Non-woven covering layer for absorbent article

The present invention relates to a disposable absorbent article, particularly a disposable absorbent article such as a feminine sanitary towel or a disposable nappy. More particularly, the present invention relates to a disposable absorbent article in which the outer surface layer is a non-woven fabric.

Conventional absorbent articles have the disadvantage that even though they absorb fluids discharged by the body, a portion of the absorbed body fluids is subsequently squeezed out under the weight of the user, so that the skin of the user becomes wetted, thereby causing discomfort or skin irritation. In order to minimize the squeezing-out of the absorbed body fluids, there has been proposed an improvement wherein a water-repellent non-woven fabric is used as the surface layer of the absorbent article. A hydrophobic substance is used as the binder for the non-woven material, or hydrophobic synthetic fibers from a portion of the fibers of the non-woven fabric. Although the squeezing-out of the absorbed body fluids is considerably minimized by this technique, the rate of absorption of the fluids into the absorbent article is greatly reduced, owing to the water-repellency of the hydrophobic substance or fibers, and this causes the fluids to escape around the sides of the absorbent article without being absorbed.

After intensive investigation on (1) the rate of absorption of body fluids into the absorbent article, and (2) the squeezing-out of the absorbed body fluids from the absorbent article, we have discovered that a satisfactory absorbent article can be obtained by using, as a surface or outer covering layer on the absorbent article, a non-woven fabric having a fibrous composition and comprising 60 to 90 wt. % of hydrophilic fibers and 40 to 10 wt. % of hydrophobic fibers, and wherein said hydrophilic fibers comprise a mixture of two kinds of fibers, i.e. from 10 to 90 wt. % of relatively thin fibers having a thickness of from 1.5 to 3 denier and from 90 to 10 wt. % of relatively thick fibers having a thickness of from 4 to 7 denier.

Fibers having a thickness of from 1.5 to 3 denier have mainly been used to make the non-woven fabrics used as the surface layers of absorbent articles. It was not thought that a satisfactory absorbent article, as that of the present invention, can be obtained by using fibers having a thickness of more than 4 denier as a part of the fiber content of the non-woven fabric.

By "hydrophilic" and "hydrophobic" fibers, we mean fibers containing and not containing, respectively, —OH groups in the molecule.

Examples of hydrophilic fibers usable in the present invention are cellulose fibers such as cotton and viscose rayon, and vinylon fibers. Examples of suitably hydrophobic fibers are polyester fibers, polyolefin fibers, and polyolefin conjugate fibers.

Although it is possible to use only one type of hydrophobic fiber, it is preferred to use a mixture of two or more different hydrophobic fibers, particularly in the case of non-woven fabrics prepared by, for example, the heat-fusion adhesion method.

The non-woven fabric used as the surface layer of the absorbent article preferably has a weight of 15 to 30 g/m². If the relatively thin hydrophilic fibers are present in an amount higher than 90 wt.%, based on the total amount of the hydrophilic fibers, the thickness of the non-woven fabric will be too great and, on the other hand, if the amount of the relatively thick hydrophilic fibers is higher than 90 wt.%, based on the total amount of the hydrophilic fibers, the thickness of the non-woven fabric layer will be too small.

The invention will now be described in more detail by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a sectional view of the feminine sanitary towel described in Example 1 below, and Figure 2 is a sectional view of the disposable nappy described in Example 2 below.

EXAMPLE 1.

There were prepared feminine sanitary towels of a size of 70—190 mm and comprising a non-woven fabric outer covering (see Figure 1), a rayon staple layer 2 (0.4 g), an absorbent tissue layer 3 (0.6 g), a fluffed pulp core 4 (4.0 g) and a water-repellent tissue layer 5 (0.6 g), as shown in Figure 1. Using various non-woven fabrics set forth in Table 1 as the non-woven fabric, the absorption rate and the amount of absorbed fluids squeezed out were measured. The results are shown in Table 1.

The absorption rate and the squeezed-out fluid (hereinafter called "wet-back") were measured by the following methods:

Absorption rate: Fibrinogen-free horse blood was deposited dropwise onto the upper surface of an inclined sample sanitary towel and the flow of the blood was observed. The length of the flow path along the napkin before the horse blood was fully absorbed in it was determined. The shorter the flow path, the higher the absorption rate.

Wet back: A given quantity of the fibrinogen-free horse blood was allowed to be absorbed by a sample sanitary towel. After a given period of time, the towel was pressed and the quantity of the blood squeezed out was measured.

TABLE 1

Sample No.	Hydrophillic fibers * 1			Hydrophobic fibers * 2 Type Amount	Weight of non-woven fabric 1	Absorption rate	Wet Back	Remarks
	Thin fibers Type Amount	Thick fibers Type Amount						
1	R1.5d 20%	0		ES 80%	21 g/m ²	150 mm	4.2 g	Conventional Sanitary Towel Ordinary
2	R1.5d 60	0		ES 40	21	55	4.5	
3	R1.5d 90	0		ES 10	19	20	6.3	
4	R3.0d 40	0		ES 60	20	150	3.9	
5	R2.0d 80	0		ES 20	17	30	6.1	
6	R1.5d 10	R5d 10%		ES 80	18	150	4.2	Comparison
7	R1.5d 20	R7d 20		ES 60	20	130	4.8	
8	R1.5d 20	R5d 40		ES 40	23	30	3.2	Present Invention
9	R1.5d 30	R7d 30		ES 40	18	30	3.1	
10	R3.0d 40	R5d 20		ES 40	18	25	3.4	
11	R1.5d 20	R5d 60		ES 20	21	20	2.9	
12	R3.0d 40	R7d 40		ES 20	17	25	3.1	
13	R3.0d 60	R5d 20		ES 20	19	15	3.0	
14	R1.5d 40	R7d 50		ES 10	18	10	3.2	
15	R1.5d 70	R7d 20		ES 10	20	10	3.3	

TABLE 1 (continued)

Sample No.	Hydrophilic fibers *1			Hydrophobic fibers *2 Type Amount	Weight of non-woven fabric 1	Absorption rate	Wet Back	Remarks
	Thin fibers Type Amount	Thick fibers Type Amount						
16	R3d 60	0		ES PET 20% 20	20 g/m ²	25 mm	4.1	Comparison
17	R3d 30	R5d 30%		ES PET 20 20	21	20	3.2	Present invention
18	R1.5d 10	R5d 10		ES PET 40 40	18	150	3.5	Comparison
19	0	0		PP 100	17	150	4.5	
20	0	0		PP 100	23	150	3.6	
21	B1.5d 40	B5d 30		ES 30	17	25	3.4	Present invention A little rigid
22	B3d 20	B5d 10		ES 70	18	150	3.8	Comparison A little rigid

The symbol "d" means denier

*1 R; Rayon B; Vinyon

*2 ES; Polyolefin conjugate fibers (3 d) PP; Polypropylene fibers (3 d)

PET; Polyester fibers (2 d)

(The above symbols have the same meanings in the following examples).

EXAMPLE 2.

There were prepared disposable nappies of a size of 400 x 250 mm comprising a non-woven fabric 6, absorbent tissue 7 (1 g x 2), a pulp fluff 8 (25 g) and a polyethylene sheet 9 (5.5 g) as shown in Figure 2. Using various non-woven fabrics as described in Table 2, the absorption rate and wet back were investigated. The results are shown in Table 2. The methods of measurement were the same as in Example 1, except that urine was used in place of the fibrinogen-free horse blood used in Example 1 and the quantity of the non-absorbed urine running off the sample nappy (without having been absorbed) was measured in the determination of the absorption rate.

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TABLE 2

Sample No.	Hydrophilic fibers			Hydrophobic fibers Type	Amount	Weight of non-woven fabric 1	Absorption rate	Wet Back	Remarks
	Thin fibers Type	Amount	Thick fibers Type						
1	R1.5d	20%		ES	80%	21 g/m ²	14.2 g	10.1 g	Comparison
2	R3d	60		ES	40	21	3.1	22.3	
3	R1.5d	90		ES	10	19	1.5	24.5	
4	R1.5d	20	R5d	ES	40	23	1.8	8.2	Present invention
5	R3d	40	R7d	ES	20	17	0.5	10.0	
6	R1.5d	10	R5d	ES	80	18	13.1	9.3	Comparison
7	R3d	30	R5d	ES PET	20 20	21	2.5	11.4	Present invention
8	R1.5d	10	R5d	ES PET	40 40	20	16.3	10.6	Comparison
9		0		PP	100	23	16.8	7.2	

EXAMPLE 3.

Commercially available feminine sanitary towels A, B and C were compared with a product of the present invention with respect to absorption rate and wet back in the same manner as described in Example 1. The results shown in Table 3 were obtained. The non-woven fabric used in the product of the present invention had the following composition:

Rayon	1.5d	20%
Rayon	5d	60
Polyolefin conjugate fibers	3d	20
Weight of fabric	21 g/m ²	

TABLE 3

Sample	Non-woven fabric	Weight g/m ²	Absorption mm	Wet Back g	Remarks (weight of sample)
A	Mainly composed of rayon (Wet) Binder type	20	150	4.5	6.4 g
B	Mainly composed of rayon (Dry) Binder type	18	95	3.8	7.2
C	Mainly composed of rayon (Dry) PP - Binder type	20	53	3.6	6.8
Present Invention		21	20	3.0	6.2

EXAMPLE 4.

Commercially available disposable nappies D, E and F were compared with a product of the present invention with respect to absorption rate and wet back in the same manner as described in Example 2. The results shown in Table 4 were obtained. The non-woven fabric used in the product of the present invention had the following composition:

Rayon	1.5d	20%
Rayon	5d	40
Polyolefin conjugate fibers	3d	40
Basis weight	23 g/m ²	

TABLE 4

Sample	Non-woven fabric	Basis weight g/m ²	Absorption rate g	Wet Back g
D	Mainly composed of rayon (Wet)	23	2.1	23.4
E	Mainly composed of rayon (Dry)	30	4.2	16.2
F	Mainly composed of polyester	21	11.4	9.6
Present Invention		23	1.5	8.3



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CLAIMS

1. An absorbent article comprising an outer covering layer of a non-woven fabric comprising 60 to 90 wt.% of hydrophilic fibers and 40 to 10 wt.% of hydrophobic fibers, wherein the hydrophilic fibers comprise 10 to 90 wt.% of fibers having a thickness of 1.5 to 3 denier and 90 to 10 wt.% of fibers having a thickness of 4 to 7 denier. 5
2. An absorbent article according to Claim 1 wherein the density of said non-woven fabric is 15 to 30 g/m².
3. An absorbent article according to Claim 1 or Claim 2 comprising an absorbent core for absorbing discharged body fluids, partially or entirely enveloped by the outer covering layer.
4. An absorbent article according to Claim 3 in which the core comprises cellulosic fibres. 10
5. An absorbent article according to Claim 1 in which the hydrophilic fibers are cotton fibers, viscose rayon fibers, vinylon fibers or mixtures thereof, and the hydrophobic fibers are polyester fibers, polyolefin fibers, polyolefin conjugate fibers, or mixtures thereof.
6. An absorbent article according to Claim 3 wherein one side of the core is associated with a fluid impervious barrier sheet to prevent passage of body fluids outwardly from one side of said absorbent article. 15
7. An absorbent article as claimed in any preceding Claim which is a feminine sanitary towel.
8. An absorbent article as claimed in Claim 1 which is a disposable nappy.
9. A feminine sanitary towel, substantially as herein described, with reference to Figure 1 of the drawings. 20
10. A disposable nappy, substantially as herein described with reference to Figure 2 of the drawings.