

SANITARY TOWEL

The present invention relates to a sanitary towel having a deodorizing capacity.

Various sanitary towels are now marketed. These sanitary towels take various forms and various contrivances are made in connection with the primary function of absorbing and retaining menstrual fluid. Recently, a highly absorbent polymer capable of absorbing physiological saline solution in an amount 30 times the weight of the polymer per se has been developed and the performance of this polymer is regarded as satisfactory. At the present, investigations are being made as to how rapidly menstrual fluid can be absorbed, and the primary function of absorbing menstrual fluid is generally adequately carried out by presently-available sanitary towels.

In order that a sanitary towel can be worn comfortably, other features such as compactness and deodorising ability are important. However, a sanitary towel which is satisfactory in these other features has until now not been developed.

As means for absorbing unpleasant odours, there has been proposed a method utilizing various adsorbents such as active carbon, and a method using a fungicide such as benzalkonium chloride or chlorophyllin. However, the deodorizing effect of an adsorbent such as active carbon is drastically reduced in the wet when menstrual fluid has been absorbed and such an

adsorbent does not effectively remove the amine-based smell. Although deodorization by a fungicide is effective to some extent in preventing putrefaction, attainment of a deodorizing effect cannot be expected within an ordinary wear period of 2 to 3 hours.

5 We have carried out research with a view to eliminating these defects involved in the conventional techniques and we found that the amine or mercaptan smell can be efficiently removed by using active carbon and sodium polyacrylate together. Thus, in accordance with the present invention, there is provided a sanitary towel comprising a layer containing a water-insoluble crosslinking-
10 type sodium polyacrylate and, contiguous therewith, a layer containing active carbon.

Examples of suitable water-insoluble crosslinking-type sodium polyacrylates are polyacrylamide/sodium polyacrylate disclosed in Japanese Patent Publication No. 43395/75 by Grain Processing Co. Ltd., starch-sodium poly-
15 acrylate disclosed in Japanese Patent Application Laid-Open Specification No. 47937/76 by Dow Chemical Co. Ltd. or in Japanese Patent Application Laid-Open Specification No. 125468/76 by Sankyo Kasei Kabushiki Kaisha, and sodium polyacrylate of the self-crosslinking type disclosed in our Japanese Patent Application Laid-Open Specification No. 46389/78.

20 As the active carbon, there may for example be used so-called powdery active carbon and fibrous active carbon in the present invention. Any type of activated carbon fibers may be used as the fibrous active carbon. Ordinarily, there may be used fibers obtained by heating phenolic resin type, rayon type or acrylic type fibers to effect carbonisation and activating the
25 resulting carbon fibers according to customary procedures. From the view-

12

-3-

point of ease of handling, it is preferred that powdery active carbon or fibrous active carbon be used in the form of a paper obtained from a mixture of such active carbon with pulp or rayon.

In the present invention, the layer containing water-insoluble cross-
5 linking type sodium polyacrylate may further contain other polymers, for example, a carboxyvinyl polymer, in an amount of up to 50% by weight. As the carboxyvinyl polymer that is used in the present invention, there can be mentioned, for example, that marketed under the registered Trade Mark "Carbopol" manufactured and supplied by B. F. Goodrich
10 Chemical Co.

Figure 1 is a sectional view showing four sanitary towels used in Example 1.

Figure 2 is a sectional view showing four sanitary towels used in Example 2.

15 Figure 3 is a sectional view illustrating two comparative sanitary towels used in Example 3.

The present invention will now be described in detail with reference to the following Examples:

Example 1

A deodorizing sanitary towel (product of the present invention) comprising a polymer sheet including 0.3 g of sodium polyacrylate inserted between two absorbent papers and an active carbon paper was compared with a sanitary towel comprising a polymer sheet including sodium polyacrylate and a napkin comprising an active carbon paper alone, with respect to deodorizing effect.

As the sanitary towels of the present invention, there were used those having structures shown in Figures 1-(A) and 1-(B). In these sanitary towels, an active carbon paper 4 (containing 0.1 g of active carbon) was arranged contiguously to a polymer sheet 5 (containing 0.3 g of sodium polyacrylate). Reference numerals 1, 2, 3, 3' and 6 represent a non-woven fabric, a rayon staple cotton, a pulp (2.2 g), an absorbent paper (2.2 g) and a leakage-preventing sheet, respectively.

As the comparative towel, there were used those having structures shown in Figures 1-(C) and 1-(D). In the comparative towel (C), reference numerals 1, 2, 3, 4', 5 and 6 represent a non-woven fabric, a rayon staple cotton, a pulp (2.2 g), an absorbent paper, a polymer sheet (containing 0.3 g of sodium polyacrylate) and a leakage-preventing sheet, respectively. In the comparative sheet (D), reference numerals 1, 2, 3, 4, 5' and 6 represent a non-woven fabric, a rayon staple cotton, a pulp (2.2 g), an active carbon paper (containing 0.1 g of active carbon), an absorbent paper and a leakage-preventing sheet, respectively.



The foregoing four sanitary towels were prepared. Each sample was packed together with a source of an amine or mercaptan smell in a 1-liter test bottle equipped with an inner plug, and after passage of a predetermined time, the smell concentration was measured by gas chromatography to determine the smell removal ratio. The obtained results are shown in Tables 1-1 and 1-2.

Table 1-1

Kind of Sanitary Towel	Mercaptan Smell Removal Ratio (%)			
	0 minute	10 minutes	20 minutes	30 minutes
towel (A) of present invention	0	87	98	100
towel (B) of present invention	0	82	99	100
comparative towel (C) comprising polymer sheet alone	0	0	0	0
comparative towel (D) comprising active carbon paper alone	0	58	65	77

Table 1-2

Kind of Sanitary Towel	Amine Smell Removal Ratio (%)			
	0 minute	10 minutes	20 minutes	30 minutes
towel (A) of present invention	0	70	89	100
towel (B) of present invention	0	68	99	100
comparative towel (C) comprising polymer sheet alone	0	47	52	68
comparative towel (D) comprising active carbon paper alone	0	49	56	69

(B)

From the results shown Tables 1-1 and 1-2, it will readily be understood that in the sanitary towels (A) and (B) of the present invention, the mercaptan smell can substantially be removed within 20 minutes, and that the comparative towels comprising the polymer sheet or active carbon paper alone have a certain deodorizing effect to the amine smell but the towels of the present invention are superior in the deodorizing effect to the amine smell.

Example 2

The influence of the positions of a polymer sheet comprising water-insoluble sodium polyacrylate (0.3 g) inserted between absorbent papers and an active carbon paper (containing 0.1 g of active carbon) on the deodorizing effect were examined.

Four sanitary towels shown in Figure 2 were prepared. In towels (A) and (A'), the polymer sheet 5 was arranged contiguously to the active carbon paper 4, but in sanitary towels (E) and (F), the polymer sheet 5 was arranged at a position separate from the carbon paper 4. The deodorizing effects of these towels (A), (A'), (E) and (F) were measured by using amine and mercaptan smells according to the same method as described in Example 1. The results obtained are shown in Tables 2-1 and 2-2.

Table 2-1

Kind of Sanitary Towel	Mercaptan Smell Removal Ratio (%)			
	0 minute	10 minutes	20 minutes	30 minutes
(A)	0	87	98	100
(A')	0	82	95	100
(E)	0	70	82	85
(F)	0	65	79	83

Table 2-2

Kind of Sanitary Towel	Amine Smell Removal Ratio (%)			
	0 minute	10 minutes	20 minutes	30 minutes
(A)	0	70	89	100
(A')	0	68	90	100
(E)	0	38	76	83
(F)	0	40	69	78

From the results shown in Tables 2-1 and 2-2, it will readily be understood that the sanitary towels (A) and (A') have a good deodorizing effect towards both the mercaptan and amine smells but the towels (E) and (F) are inferior to the towels (A) and (A') in deodorizing effect.

In the case where the polymer sheet and the active carbon paper are contiguous as in towels (A) and (A'), the smell absorbed and held in the polymer sheet is effectively removed by the adjacent active carbon

(B)

paper. In the case of the towels (E) and (F), since the polymer sheet is separate from the active carbon paper, the smell absorbed and held in the polymer sheet is not in either case effectively removed. Accordingly, the polymer sheet should be arranged contiguous
5 with the active carbon paper.;

Example 3

A sanitary towel (product of the present invention) comprising water-insoluble sodium polyacrylate and active carbon paper was compared with sanitary napkins composed mainly of pulp or crepe paper with respect to deodorizing effect.

10 The towel of the present invention had the structure of Figure 1-(A) illustrated in Example 1. As the active carbon sheet, there was used a paper made from a mixture of a fibrous active carbon of the phenolic resin, rayon or acrylic type or a powdery active carbon with pulp or rayon. In this case, 0.1 g of the fibrous or powdery active carbon was used per 0.3 g
15 of water-insoluble sodium polyacrylate.

As the sanitary towel composed mainly of pulp, there was used a towel having a structure shown in Figure 3-(G). Reference numerals 1, 3 and 6 represent a non-woven fabric, a pulp and a leakage-preventing sheet, respectively. As the towel composed mainly of crepe paper, there was used
20 a towel having a structure shown in Figure 3-(H). Reference numerals 1, 7 and 6 represent a non-woven fabric, a crepe paper and a leakage-preventing sheet, respectively.

The deodorizing effects of these towels were measured by using sources of mercaptan and amine smells according to the same method as described in Example 1. The obtained results are shown in Tables 3-1 and 3-2.

Table 3-1

<u>Kind of Sanitary Towel</u>	<u>Mercaptan Smell Removal Ratio (%)</u>			
	<u>0 minute</u>	<u>10 minutes</u>	<u>20 minutes</u>	<u>30 minutes</u>
Sanitary Towel (A) of present invention				
powdery active carbon	0	87	98	100
phenolic resin type fibrous active carbon	0	83	99	100
rayon type fibrous active carbon	0	79	98	100
acrylic type fibrous active carbon	0	85	99	100
Sanitary Towel (G) composed mainly of pulp	0	0	0	0
Sanitary Towel (H) composed mainly of crepe paper	0	0	0	0

20

Table 3-2

<u>Kind of Sanitary Towel</u>	<u>Amine Smell Removal Ratio (%)</u>			
	<u>0</u> <u>minute</u>	<u>10</u> <u>minutes</u>	<u>20</u> <u>minutes</u>	<u>30</u> <u>minutes</u>
Sanitary Towel (A) of present invention				
powdery active carbon	0	70	89	100
phenolic resin type fibrous active carbon	0	61	95	100
rayon type fibrous active carbon	0	68	85	100
acrylic type fibrous active carbon	0	70	93	100
Sanitary Towel (G) composed mainly of pulp	0	0	10	21
Sanitary Towel (H) composed mainly of crepe paper	0	0	13	27

From the results shown in Tables 3-1 and 3-2, it will readily be understood that the sanitary towel of the present invention has a good deodorizing effect towards both the mercaptan and amine smell irrespective of whether the active carbon is powdery or fibrous and also irrespective of whether the starting carbon-containing fiber of the fibrous active carbon is a phenolic resin type fiber, a rayon type fiber or an acrylic type fiber. It will also be understood that the comparative towels composed mainly of pulp or crepe paper have no deodorizing effect towards the mercaptan smell and their deodorizing effect towards the amine smell are very low.

Accordingly, it has been confirmed that the towel of the present invention has a very good deodorizing effect on menstrual fluids.

21

Example 4

- 12 -

The deodorizing effects of a sanitary towel of the present invention having a structure of Figure 1-(A) comprising a non-woven fabric 1, a rayon staple cotton 2, a pulp 3 (2.0 g), an active carbon paper 4 (containing 0.3 g of active carbon), a sheet 5 comprising 0.3 g of sodium polyacrylate/Carbopol 5 (registered Trade Mark) 934 (mixing ratio = 80/20) inserted between absorbent papers and a leakage-preventing sheet 6 and a comparative sanitary towel of Fig.3-(G) composed mainly of pulp were examined.

The sample towel was packed together with a source of mercaptan smell 10 into a wide-mouth bottle having a capacity of about 1 liter, and after passage of 1 hour, the mercaptan smell concentration was measured to determine the smell removal ratio.

The sample of the present invention showed a smell removal ratio of 100% but the smell removal ratio of the comparative sample was 0%.

15 The measurement was similarly conducted by using an amine smell source. The smell removal ratio of the sanitary towel of the present invention was 100% but the smell ratio of the comparative towel was 0%.

As is apparent from the results obtained in this Example, even if other 20 polymeric substance is present in the layer of sodium polyacrylate, the intended deodorizing effect can be obtained, though it is preferred that the amount of such polymeric substance be up to 50%.



22

CLAIMS:

1. A sanitary towel comprising a layer containing water-insoluble cross-linking type sodium polyacrylate and, contiguous therewith, a layer containing active carbon.
 - 5 2. A sanitary towel as set forth in claim 1, wherein the layer containing water-insoluble crosslinking type sodium polyacrylate further contains a carboxyvinyl polymer.
-