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(54)Title: DETERGENT AND METHOD OF CLEANING WITH THE SAME

(54)発明の名称 洗浄剤及びそれを利用した洗浄方法

(57) Abstract

A detergent for use in a cleaning method comprising adhering bubbles of a detergent liquid to the surface of an object to be cleaned, e.g., a tire wheel, and removing the adherent dirt from the object surface with the detergent bubbles, characterized by comprising a surfactant, at least one alkali compound selected from the group consisting of ammonia and aminated alkali compounds, and at least one indicator which changes its color upon a change from alkalinity to neutrality, the alkali compound being contained in such an amount that the alkali compound disappears through reaction with carbon dioxide in the same period as that required for removing almost all the dirt from the surface of the object.

Detergent and Cleaning Method

Background of the Invention

Field of the Invention

The present invention relates to a detergent and a cleaning method with the detergent, more particularly to a detergent for cleaning tyre wheels, coated surfaces and windows of vehicles, and surfaces of various kinds of things which enables one to recognise the point when its ability to remove grime becomes lost with eyes and a method of cleaning tyre wheels with the detergent.

Description of Related Art

Tyre wheels are mounted on tyres of automobiles and hence a variety of grime can be deposited on the tyre wheels in an amount increased with time.

For example, brake disks are mounted near the wheels, and dust particles produced from the brake pad or brake lining are deposited on the tyre wheels. Furthermore, the wheels splash mud on themselves during the running of automobiles. When automobiles run on asphalted roads, fine particles of petroleum products such as pitch are also deposited on the wheels. Thus, a variety of grime can stick onto the wheels.

The grime sticks onto the tyre wheels in the following manner: dust particles themselves rubbed off from the brake pad or brake lining do not stick onto the wheel surface. The materials derived from air and/or roads act as an adhesive to allow the dust particles adhere to the wheel surface.

Dirty tyre wheels are washed with a surfactant-based detergent. In this case, the detergent is sprayed onto the wheels in a foamy state. The foamy detergent-applied wheels are left standing as it is for a while. Thus, the materials for adhering the metal particles, stone particles and petroleum solid particles onto the wheels are wetted with the foamy detergent, thereby allowing the foamed detergent to take these particles therein, and then allowing these particles to leave the surface of the wheels or float over the surface of the wheels. Finally, the foamy detergent takes the grime particles therein.

Thereafter, the detergent can be wiped off or removed away by water.

However, it is uncertain to users or customers how long it requires for the detergent to swell the grime, penetrate in to it and finally remove the dust particles, mud and petroleum product particles from the wheels. Furthermore, the time required for the detergent to eliminate these particles varies depending upon the deposited amounts of the particles and/or applied detergent. In short, in eliminating an entirety of grime sticking onto the wheels, it is uncertain to users or customers what amount of detergent should be used, and how long the detergent should be left on the wheels before removed away.

Therefore, nowadays an amount of most commercially available detergents used has to be measured by eyes, and the applied detergents have to be removed in a time decided by users themselves by guess.

There may occur such problems that the tyre wheels are not well cleaned because of the time decided being too short or damaged with the detergent because of the time decided being too long.

In the above, we pointed out the problems that may occur in cleaning tyre wheels as an example of the objects to be cleaned. It is unknown to the customer how long a detergent should be



left on the object in order to clean it properly. If a period appropriate to cleaning the object of dirt can exactly be judged by eyes, it will make the cleaning operation effective and make the cleaning effect on the object greatest, which is preferable.

Summary of the Invention

5 The first object of the present invention is to provide a detergent for cleaning a surface such as that of tyre wheels, which enables one to easily know the timing for removing the detergent, in which the grime adhered to the surface is included from it by colour change of the detergent, and to provide a method of cleaning a surface such as that of tyre wheels with the above-mentioned detergent.

The second object of the present invention is to provide a detergent for cleaning a surface such
10 as that of tyre wheels, which enables one to accurately recognise the point when the detergent's ability to remove grime becomes lost, and gives a high degree of cleaning effect without damaging the surface, even though the detergent is left on the surface for a long time, and to provide a method of cleaning a surface such as that of tyre wheels with the above-mentioned detergent.

Disclosure of the Invention

15 In a well-known surface cleaning method, a foamy detergent is applied onto a surface, eg. a surface of tyre wheels having grime adhered thereto, and then the grime is released with the foamy detergent from the surface. According to the present invention, the detergent is featured by comprising a surfactant, at least one alkali compound selected from the group consisting of ammonia and amino group-containing alkali compounds, and a colour change indicator capable of changing its
20 own colour when turned from an alkaline condition to a neutral condition, and the alkali compound is contained in the detergent in such an amount that the compound is eliminated from the detergent by reaction with carbon dioxide for the same period of time as required to release most amount of grime from the surface.

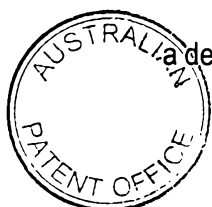
In one embodiment, the above-mentioned detergent, eg. a tyre wheel-cleaning detergent may
25 contain a colour pigment or dye. In another embodiment, the detergent may contain an anionic and/or nonionic surfactant as the above-mentioned surfactant. In a further embodiment, the above-mentioned anionic surfactant may be at least one salt selected from the group consisting of alkylbenzene sulfonates, alkyl sulfosuccinates and mixtures thereof. In a still further embodiment, the above-mentioned amino group-containing alkali compound may be at least one alkali compound selected
30 from the group consisting of morpholine and alkanolamines.

The colour change indicator used in the present invention may be phenolphthalein which can change its own colour when turned from alkaline condition to acidic condition.

In one of the preferred embodiments of the present invention, the above-mentioned detergent is applied in a foamy state onto the surface, eg. tyre wheels, and the foamy detergent on the surface is
35 removed only when the original colour of the foamy detergent is changed to another colour.

Best Modes of Working for the Present Invention

The detergent and the cleaning method of the invention will be explained in the followings with a detergent for cleaning tyre wheels and a cleaning method using it being taken as an example.



The detergent for tyre wheels, which is an example of the present invention, is applied in a foamy state onto the surface of the tyre wheels to swell grime adhered to the tyre wheels, particularly metal particles, stone particles, mud particles and particles of materials such as petroleum solid products consolidating the grime, or penetrate into such materials to soften the grime, and then the applied detergent is left to stand for a predetermined time to take the grime into the foam of the detergent, thereby providing the cleaning effect.

The detergent for cleaning tyre wheels contains the surfactant to obtain this cleaning effect.

As the surfactant, reference may be made to anionic surfactants, amphoteric surfactants and nonionic surfactants.

As the anionic surfactant, reference may be made to salts of organic acids such as carboxylates and sulfonates, salts of sulfuric esters and salts of phosphoric esters.

As the carboxylates, reference may be made to salts of higher fatty acids such as sodium laurate, potassium laurate, sodium myristate, sodium palmitate, sodium stearate, sodium oleate, potassium oleate and ether carbonate, or salts of alkyl sulfo-fatty acids represented by the formula of $\text{MO}_3\text{SCH}(\text{CH}_2\text{COOR}_1)\text{COOR}_2$, wherein R_1 and R_2 both may be a hydrocarbyl group, preferably an alkyl group, and M may be a metal or an organic base, particularly preferably sodium, potassium, ammonium, amine and triethanolamine. As the salts of alkyl sulfofatty acids reference may be made to alkyl sulfosuccinates such as monoalkylsulfosuccinates and dialkylsulfosuccinates.

As the sulfonates, reference may be made to sulfonates such as higher alkyl sulfonates, α -olefinsulfonates, sulfonates of higher fatty esters, dialkylsulfosuccinates, sulfonates of higher fatty amides, and a formalin condensate of alkylarylsulfonates such as an alkylbenzenesulfonate and alkyl-naphthalenesulfonate and alkylarylsuccinates. The above-mentioned salts of alkyl sulfo-fatty acids can be represented by the formula of $\text{MO}_3\text{SCH}(\text{CH}_2\text{COOR}_1)\text{COOR}_2$, wherein R_1 and R_2 both may be a hydrocarbyl group, preferably an alkyl group, and N may be a metal or an organic base, particularly preferably sodium, potassium, ammonium, amine and triethanolamine.

As the salts of sulfuric esters, reference may be made to sulfuric ester salts of higher alcohols, sulfuric ester salts of higher secondary alcohols, sulfuric ester salts of alkyl ethers, sulfuric ester salts of alkylarylethers, alkylsulfuric ester salts, sulfuric ester salts of higher fatty esters, sulfuric ester salts of higher fatty alkanolamides, and sulfurised petroleum.

As the salts of phosphoric esters, reference may be made to sodium dodecylphosphate, sodium polyoxyethylenelauryl ether phosphate, sodium polyoxyethylenecetyl ether phosphate, sodium polyoxyethyleneoleyl ether phosphate and sodium polyoxyethylenealkylphenyl ether phosphate.

As the amphoteric surfactant, reference may be made to N-lauryl β -alanine, N-stearyl β -alanine, N,N,N-trimethylaminopropionic acid, N-hydroxyethyl-N,N-dimethylaminopropionic acid, N-methyl-N,N-dihydroxyethylaminopropionic acid, N,N,N-trihydroxyethylaminopropionic acid, N-lauryl-N,N-dimethylaminopropionic acid, N-myristyl-N,N-dimethylaminopropionic acid, N-palmityl-N,N-dimethylaminopropionic acid, N-stearyl-N,N-dimethylaminopropionic acid, N-hexyl-N,N-dimethylaminoacetic acid, N-octyl-N,N-dimethylaminoacetic acid, N-decyl-N,N-dimethylaminoacetic acid, N-undecyl-N,N-dimethylaminoacetic acid, N-lauryl-N,N-dimethylaminoacetic acid, N-myristyl-



N,N-dimethylaminoacetic acid, N-palmityl-N,N-methylaminoacetic acid, N-stearyl-N,N-dimethylaminoacetic acid, 1-pyridiumbetain and 1- α -picoliniumbetain.

As the nonionic surfactant, reference may be made to nonionic surfactants of an ether type, ether-ester type, ester type and block polymer type and a nitrogen-containing nonionic surfactant.

5 The nonionic surfactant of an ether type may be surfactants of a single-chain polyoxyethylene ether type; polyoxyethylenealkyl or alkylaryl ethers such as polyoxyethylenealiphatic alcohol ether, polyoxyethylenealkylaryl ether type and polyoxyethylenelanolin alcohol; and an ethylene oxide derivative of an alkylphenol-formalin condensate.

The nonionic surfactant of an ether-ester type may be an ester bond-containing
10 polyoxyethylene ether such as polyoxyethylenesorbitan-fatty ester, polyoxyethyleneglyceryl-mono-fatty ester, polyoxyethylenepropyleneglycol-fatty ester and polyoxyethylenesorbitol-fatty ester; and a polyoxyethylene derivative of a natural fatty, oil and wax.

The nonionic surfactant of an ester type may be a polyoxyethylene-fatty ester and polyalcohol ester.

15 The nonionic surfactant of a block polymer type may be surfactants of a Pluronic type and of a Tetronic type and an alkyl group-containing block polymer.

The nitrogen-containing nonionic surfactant may be polyoxyethylene-fatty amide, alkanolamide and polyoxyalkylamine.

Of these surfactants are preferred the anionic surfactant and nonionic surfactant. Of the anionic
20 surfactants are preferred the alkylbenzenesulfonates and alkylbenzenesuccinates. The combined use of the alkylbenzenesulfonates and alkylbenzenesuccinates is particularly preferred.

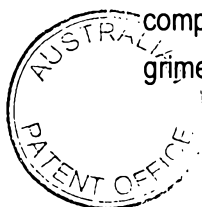
In the present invention, the content of the anionic surfactant is normally in the range of 0.1-10% by weight, preferably 0.4-0.7% by weight, of the detergent.

The detergent of the present invention contains at least one alkali compound selected from the
25 group consisting of ammonia and amino group-containing alkali compounds, and a colour change indicator.

As the above-mentioned amino group-containing alkali compounds, reference may be made to morpholine, alkanolamines, aniline, alkylamines and alkylenediamine. The alkanolamine may be monomethanolamine, monoethanolamine and monopropanolamine. The alkylamine may be
30 ethylamine and propylamine. The alkyldiamine may be ethylenediamine.

In the detergent for cleaning tyre wheels, the alkali compound is contained in such an amount that the detergent can turn from neutral to acidic by reaction with carbon dioxide for the same period of time as that required for the detergent to allow the grime on tyre wheel to come off from the tyre wheel.

35 That is, when the detergent is sprayed in a foamy state, the alkali compound in the detergent begins to react with carbon dioxide in atmosphere, and concurrently the detergent begins to allow the grime on tyre wheels to be softened, swollen and wetted. Thus, the total amount of the alkali compound should be completely reacted with carbon dioxide when substantially whole amounts of the grime adhered to the surface of tyre wheels are taken into the foamy detergent.



The cleaning effect by which the grime on the surface of tyre wheels is taken into the foamy detergent varies depending upon the composition of the detergent and, therefore, the content of the alkali compound to be contained in the detergent should be experimentally determined for each of the detergents.

5 Furthermore, depending on kinds of surfaces to be cleaned and kinds of dirty, it will be necessary to change the cleaning time, which means a time necessary for the detergent to change its colour after application of the detergent onto a surface. When the amount of dirt is large, and dirt strongly adheres to the surface, the cleaning time can be prolonged by increasing the amount of alkaline compounds included in the detergent. In the opposite case, the cleaning time can be
10 shortened by decreasing the amount of alkaline compounds. Thus adjusting of the amount of alkaline compounds depending on the properties of the surface to be cleaned and the composition of the detergent leads to adjustment of the cleaning time.

In one embodiment of the present invention, the content of the alkali compound may be normally in the range of 0.05-2% by weight, preferably 0.2-1% by weight, for ammonia. In another
15 embodiment, it may be normally in the range of 0.5-5% by weight, preferably 1-3% by weight, for the amino group-containing alkali compound.

If the content of ammonia and the amino group-containing alkali compound is less than the above-mentioned range, the colour changing time may be too short to allow the grime to adequately come off from the tyre wheels. On the other hand, if this content is more than the above-mentioned
20 range, then an offensive smell may be emitted so that cleaning work is made hard, or an excess of the alkali compound is brought into contact with the tyre wheels so that the tyre wheels may be damaged.

In the present invention, in order to raise the stability of the alkali compound in the detergent, an alkali salt of an organic acid such as ammonium benzoate, ammonium acetate, sodium acetate, ammonium oxalate and sodium oxalate may be contained in the detergent.

25 The detergent for cleaning tyre wheels contains a colour change indicator capable of discolouring when changed from alkaline to neutral. As the colour change indicator, reference may be made to a pH indicator such as phenolphthalein, thymol blue, thymolphthalein and phenol red.

The detergent is featured in that it can show the point when the ability to remove the grime becomes lost. Therefore, one or both of a pigment and dye may be used together with the colour
30 change indicator. Such pigment or dye may be iron oxide yellow, phthalocyanine green, phthalocyanine blue, brilliant blue FCF, acid red and sunset yellow FCF.

Of these colour change indicators, are preferred phenolphthalein and thymolphthalein. To these it is preferred to add phthalocyanine blue as pigment or dye.

The content of the colour change indicator in the detergent varies depending upon the content
35 of the alkali compound in the detergent, and should be adjusted so that the colour change indicator may have a colour under neutral condition when the detergent having been applied to tyre wheels turns to neutral. Generally, it may be in the range of 0.001-2% by weight, preferably 0.005-0.2% by weight. If it is less than the range, then the clear finish point cannot be recognised. On the other hand, if it is more than the range, then no additional effect can be expected by the increased amount.



The detergent for cleaning tyre wheels contains water and a water-soluble alcohol as solvent. The water-soluble alcohol may be methanol, ethanol, isopropanol and butanol. These water-soluble alcohols can act as a solvent for the colour change indicator. Furthermore, water can also act as a solvent for the detergent.

5 The detergent for cleaning tyre wheels may also contain a silicone oil, modified silicone oil, liquid paraffin and polybutene for affording water repellency to the cleaned surface of tyre wheels. Furthermore, it may contain a hydrocarbon solvent for improving the detergency for oily grime, thereby forming a uniform emulsified detergent.

The detergent for cleaning tyre wheels is prepared by mixing some or all of the above-
10 mentioned components.

The cleaning of dirty tyre wheels and recognition of the point when the ability to remove the grime becomes lost can be made by using the detergent for cleaning tyre wheels as follows:

The detergent for cleaning tyre wheels may normally be canned in an aerosol form or packed in a hand-spray container. Furthermore, it may be applied to the surface of tyre wheels with cloth and
15 sponge.

In the case where the detergent is packed in an aerosol can or hand-spray container, it is deposited on the tyre wheels in a foamy state when sprayed. Directly after the detergent is applied, the alkali compound is not vaporised, and the reaction of the compound with carbon dioxide in air does not proceed and hence the detergent remains alkaline. Thus, the detergent as sprayed has a
20 colour. Leaving the foamy detergent on tyre wheels will allow the neutralisation of the alkali compound with carbon oxide in air to proceed.

The neutralisation proceeds to spend the amount of the alkali compound, thereby allowing the detergent to transfer in a neutral condition and change its own colour. For example, the detergent turns from blue to yellow in the case where the colour change indicator is thymol blue, from pink to
25 colourless in the case where the indicator is phenolphthalein, from red to yellow in the case where the indicator is phenol red.

The change of the detergent reveals that the grime on the tyre wheels has been taken into the foamy detergent. Thereafter, the detergent is wiped off or washed away with water.

In the above we explained the detergent and cleaning method of the invention taking a tyre
30 wheel-cleaning detergent as an example. Detergents of the invention, however, are not limited to those whose target is a tyre wheel. Detergents of the invention can be used for cleaning surfaces of various kinds of things.

The detergent of the invention may suitably be applied to, in addition to the tyre wheels, coated surfaces of vehicles, windows of vehicles, surfaces of plastic exterior equipment of vehicles, etc.

35 The present invention will be illustrated below with reference to some examples.

Example 1

A detergent for cleaning tyre wheels was prepared to have the following composition:

Sodium alkylbenzenesulfonate	1% by weight
Sodium alkylsulfosuccinate	1.5% by weight



	Isopropyl alcohol	5% by weight
	Phenolphthalein	0.005% by weight
	Morpholine	2% by weight
	Deionised water	residual amount (*)
5	Total	100% by weight

(*) Residual amount" means a so calculated amount that the total amount of the components is 100%. In the followings, "residual amount" means the same.

The resulting detergent was packed in an aerosol can and sprayed onto a tyre wheel made of aluminium from the aerosol can. Thus, the detergent was deposited in a foamy state on the entire
10 surface of the wheel and had a pink colour as sprayed, and then left standing for a while as it was. The colour of the detergent gradually faded, and finally the detergent turned colourless. Thereafter, the detergent was hosed of f from the wheel. The wheel was observed to be thoroughly cleaned.

Example 2

	A detergent for cleaning tyre wheels was prepared to have the following composition:	
15	Sodium alkylbenzenesulfonate	4% by weight
	Sodium alkylsulfosuccinate	2% by weight
	Synthetic hydrocarbon solvent	40% by weight("Isopar M" made by EXXON CHEMICAL INC.)
	Silicone Oil	3% by weight
	Phenolphthalein	0.05% by weight
20	Isopropyl alcohol	5% by weight
	Morpholine	2% by weight
	Deionised water	residual amount
	Total	100 % by weight

The resulting detergent was sprayed onto the dirty surface of a tyre wheel using an aerosol
25 container in the same manner as in Example 1. Thus, the detergent was foam-sprayed onto the entire surface of the wheel and had a pink colour as sprayed, and then left standing for a while as it was. The colour of the detergent gradually faded, and finally the detergent turned colourless. Thereafter, the detergent was hosed of f from the wheel. The wheel was observed to be thoroughly cleaned.

Example 3

30	A detergent for cleaning tyre wheels was prepared to have the following composition:	
	Sodium alkylbenzenesulfonate	1% by weight
	Sodium alkylsulfosuccinate	1.5% by weight
	Isopropyl alcohol	5% by weight
	Phenolphthalein	0.005% by weight
35	Blue pigment (1% aqueous solution)	2% by weight
	Morpholine	2% by weight
	Deionised water	residual amount
	Total	100 % by weight



The resulting detergent was sprayed onto the dirty surface of a tyre wheel using an aerosol container in the same manner as in Example 1. Thus, the detergent was foam-sprayed onto the entire surface of the wheel and had a violet colour as sprayed, and then left standing for a while as it was. The colour of the detergent gradually faded, and finally the detergent turned blue. Thereafter, the
5 detergent was hosed off from the wheel. The wheel was observed to be fully cleaned.

Example 4

A detergent for cleaning tyre wheels was prepared to have the following composition:

	Sodium alkylbenzenesulfonate	4% by weight
	Sodium alkylsulfosuccinate	2% by weight
10	Synthetic hydrocarbon solvent	40% by weight("Isopar M" mentioned above)
	Silicone Oil	3% by weight
	Phenolphthalein	0.005% by weight
	Blue pigment (1% aqueous solution)	5% by weight
	Ethanol	5% by weight
15	Morpholine	2% by weight
	Deionised water	residual amount
	Total	100% by weight

The thus obtained detergent for tyre wheels was packed in an aerosol container in the same manner as in Example 1, and sprayed onto the surface of a tyre wheel made of aluminium from the
20 aerosol container. Thus, the detergent was deposited in a foamy state on the entire surface of the wheel and had a violet colour as sprayed, and then left standing for a while as it was. The colour of the detergent gradually faded, and finally the detergent turned blue. Thereafter, the detergent was hosed of f from the wheel. The wheel was observed to be fully cleaned.

Example 5

25 A detergent for cleaning tyre wheels was prepared to have the following composition:

	Sodium alkylbenzenesulfonate	1% by weight
	Sodium alkylsulfosuccinate	1.5% by weight
	Synthetic hydrocarbon solvent	40% by weight("Isopar M" mentioned above)
	Ethanol	5% by weight
30	Phenolphthalein	0.005% by weight
	Ammonium benzoate	0.5% by weight
	Ammonia	1% by weight
	Deionised water	residual amount
	Total	100% by weight

35 The resulting detergent for tyre wheels was packed in an aerosol container in the same manner as in Example 1, and was sprayed onto the dirty surface of a tyre wheel from the aerosol container. Thus, the detergent was deposited in a foamy state on the entire surface of the wheel and had a pink colour as sprayed, and then left standing for a while as it was. The colour of the detergent gradually



faded, and finally the detergent turned colourless. Thereafter, the detergent was removed from the wheel by washing with water. The wheel was observed to be fully cleaned.

Example 6

A detergent for cleaning tyre wheels was prepared to have the following composition:

5	Sodium alkylbenzenesulfonate	1% by weight
	Sodium alkylsulfosuccinate	1.5% by weight
	Ethanol	5% by weight
	Phenolphthalein	0.005% by weight
	Ammonia	0.5% by weight
10	Ammonium benzoate	0.5% by weight
	Deionised water	residual amount
	Total	100% by weight

The resulting detergent was packed in an aerosol container in the same manner as in Example 1 and sprayed onto the dirty surface of a tyre wheel from the aerosol container. Thus, the detergent was deposited in a foamy state on the entire surface of the wheel and had a pink colour as sprayed, and then left standing for a while as it was. The colour of the detergent gradually faded, and finally the detergent turned colourless. Thereafter, the detergent was hosed off from the wheel. The wheel was observed to be fully cleaned.

Example 7

0.01% by weight of thymol phthalein was added to the composition of Example 1. The cleaning of a tyre wheel was conducted in the same manner as in Example 1. The detergent turned from violet to colourless. The same cleaning effect was obtained.

Example 8

A detergent for cleaning tyre wheels was prepared to have the following composition:

25	Sodium alkylbenzenesulfonate	0.5% by weight
	Phenolphthalein	0.005% by weight
	Ammonia	0.5% by weight
	Deionised water	residual amount
	Total	100% by weight

The resulting detergent was packed in an aerosol container in the same manner as in Example 1 and tested in the same manner as in Example 1. A pink colour of the detergent, which had been deposited on the surface of the wheel in a foamy state, gradually faded, and finally the detergent turned colourless. Thereafter, the detergent was hosed off from the wheel. The wheel was observed to be fully cleaned.

Example 9

A detergent for cleaning tyre wheels was prepared to have the following composition:

	Sodium alkylbenzenesulfonate	0.5% by weight
	Silicone oil	0.5% by weight



Phenolphthalein	0.005% by weight
Morpholine	2.5% by weight
Deionised water	residual amount
Total	100% by weight

5 The resulting detergent was packed in an aerosol container in the same manner as in Example 1 and tested in the same manner as in Example 1. A pink colour of the detergent, which had been deposited on the surface of the wheel in a foamy state, gradually faded, and finally the detergent turned colourless. Thereafter, the detergent was hosed of f from the wheel. The wheel was observed to be fully cleaned.

10

Example 10

A detergent for cleaning tyre wheels was prepared to have the following composition:

Sodium alkylbenzenesulfonate	0.5% by weight
Silicone oil	0.5% by weight
Phenolphthalein	0.002% by weight
15 Blue pigment (1% aqueous solution)	5.0% by weight
Morpholine	2.5% by weight
Deionised water	residual amount
Total	100% by weight

20 The resulting detergent was packed in an aerosol container in the same manner as in Example 1 and tested in the same manner as in Example 1. A violet colour of the detergent, which had been deposited on the surface of the wheel in a foamy state, gradually faded, and finally the detergent turned blue. Thereafter, the detergent was hosed of f from the wheel. The wheel was observed to be fully cleaned.

According to the present invention is provided a detergent, specially for cleaning tyre wheels, 25 which enables one to recognise the point when the ability to remove the grime becomes lost by colour change of the detergent. Use of the detergent of the present invention, specially for cleaning tyre wheels can eliminate such problems of prior art that the detergent is wiped of f or washed away before the grime on the target, eg. wheels is completely removed, which results in insufficient cleaning, or the target is inconveniently damaged by the detergent depositing on it unnecessarily long even though the 30 grime is completely removed by taking it into the detergent.



The claims defining the invention are as follows:

1. A detergent which is applied in a foamy state onto a surface to be cleaned, thereby allowing a grime sticking onto the surface to come off from the surface, which comprises a surfactant, at least one alkali compound selected from the group consisting of ammonia and amino group-
5 containing alkali compounds, and a colour change indicator capable of changing its own colour when turned from an alkaline condition to a neutral condition, in which the alkali compound is contained in the detergent in such an amount that the compound is eliminated from the detergent by reaction with carbon dioxide for the same period of time as required to release most amounts of grime from the surface.
- 10 2. The detergent according to claim 1, wherein said surfactant is at least one selected from the group consisting of anionic surfactants and nonionic surfactants.
3. The detergent according to claim 1 or claim 2, further containing one or both of pigments and dyes.
4. The detergent according to any one of claims 1 to 3, wherein said anionic surfactant is at
15 least one selected from the group consisting of alkylbenzenesulfonates and salts of alkyl sulfofatty acids.
5. The detergent according to any one of claims 1 to 4, wherein said anionic surfactant is a mixture of alkylbenzenesulfonates and alkylsulfosuccinates.
6. The detergent according to any one of claims 1 to 5, wherein said amino-containing alkali
20 compound is at least one selected from the group consisting of morpholine and alkanolamine.
7. The detergent according to any one of claims 1 to 6, wherein said colour change indicator is phenolphthalein.
8. The detergent according to any one of claims 1 to 7, wherein said colour change is a
25 mixture of phenolphthalein and thymolphthalein.
9. A detergent which is applied in a foamy state onto a surface to be cleaned, thereby allowing a grime sticking onto the surface to come off from the surface, said detergent being substantially as hereinbefore described with reference to any one of the examples.
10. The detergent according to any one of claims 1 to 9, wherein said surface is a surface of
30 tyre wheels.
11. A method for cleaning a surface which comprises depositing the detergent claimed in any one of claims 1 to 9 in a foamed state on the surface and removing the foamed detergent from the surface when the foamed detergent changes its own colour.
12. The method according to claim 11 wherein said surface is a surface of tyre wheels.
13. A method for cleaning a surface, said method being substantially as hereinbefore
35 described with reference to any one of the examples.

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