DISH WASHER HAVING A SYSTEM FOR ATOMIZING DISHWASHING LIQUID AND METHOD FOR THE OPERATION THEREOF

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Abstract
A dishwasher including at least one washing compartment for receiving dishes to be washed, to which washing liquid is applied during a washing operation, and an atomization facility for atomizing one of the washing liquid and the washing liquid mixed with active detergent substances, wherein the atomization facility includes an ultrasound generator, and a blower that conveys the atomized washing liquid into the washing compartment.
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[0001] The subject matter of the present invention is a dishwasher with at least one washing compartment and an apparatus for wetting the dishes arranged in the washing compartment with dishwashing liquid. The invention relates especially to a dishwasher with a system for even distribution of washing liquid in the washing compartment as well as a method for operation thereof. The invention further relates to an apparatus for dispensing of active detergent substances, such as cleaning or rinsing agents.

[0002] Usually one or more washing processes are executed in a dishwasher during a dishwashing program using washing liquid, with the washing liquid, to increase the cleaning power, being mixed with active detergent substances, such as a cleaning agent of example. During the washing processes with washing liquid will be sprayed by means of spray devices into the washing compartment. The last washing process is generally followed by a rinsing phase, in which the washing liquid is mixed with a rinsing agent. It has proved to be advantageous for the result of the cleaning for the washing liquid mixed with the cleaning agent to be distributed evenly onto the dishes even before the actual washing process is undertaken and be able to act for a certain period on the dirt on the dishes. With a few washing programs the dishes are thus wetted at the beginning of the washing program via the spray devices with washing liquid which has previously been mixed with cleaning agents.

[0003] Dishwashers with spray devices are known in which the washing liquid is distributed by means of rotating spray arms in the washing compartment. Since the washing compartment in dishwashers usually has a rectangular outline while the rotating spray arms usually have a circular area of action, the washing liquid is not distributed evenly in every area of the washing compartment. Dishwashers with spray devices are also known in which the dishes have washing liquid applied to them via a fixed spray nozzle or spray head, which is arranged on the rear wall of the washing compartment. Furthermore devices are known in the prior art in which a so-called spray floor applies washing liquid to the dishes located above it. The disadvantage with these spray devices has proved to be that the spray jets emitted from the fixed spray nozzles produce spray jets with predetermined directions, so that an even cleaning of the dishes distributed in the washing compartment is not guaranteed. The known mechanical distributor systems have the further disadvantage of spray nozzles being used which are prone to blockage, by dishwashing residues for example.

[0004] In the prior art there are already aids for atomizing liquids known from other technical fields, such as from the cosmetic industry for atomization of hair sprays and perfumes, in medicine for atomizing medical agents, in chemistry for misting of liquid reagents, as well as in the area of domestic technology as room air humidifiers. A few known atomizers work by means of mechanical atomization, in which the liquid to be atomized is pressurized by mechanical means, such as by a valve. This causes the liquid to be atomized to flow in small drops and to form a liquid vapor. The overpressure needed is created by a pump process, for example manually with perfume atomizers, or by using over-pressure reservoirs, e.g. propellant gas in hair sprays.

[0005] Such aids for atomization of washing liquid, through so-called atomizers or misters are also known in their use in dishwashers. In this case the atomization of the washing liquid mixed with active detergent substances creates a mist of washing liquid droplets with small droplet diameters, which increases the effectiveness of the washing liquid mixed with active detergent substances, since washing liquid droplets with small droplet diameters can penetrate into the dirt on the dishes. For example a dishwasher is described in publication EP 487 474 in which the cleaning agent mixed with the washing liquid is atomized in the washing compartment of the dishwasher by means of an ultrasound generator. The system disclosed in EP 487 474 has the disadvantage however that, although the washing liquid fluid is atomized into a fine vapor, an efficient distribution of the vaporized washing liquid in the washing compartment is not guaranteed.

[0006] One object of the present invention consists of providing a dishwasher with an atomizer system which enables the most efficient possible atomization as well as a rapid and even distribution of the washing liquid mixed with cleaning agent in the washing compartment of the dishwasher. A further object of the present invention consists of providing a dishwasher with an apparatus by which the required quantity of active detergent substances in the washing liquid is able to be controlled for the optimum cleaning effect. Yet another object of the present invention consists of providing a method for operating a dishwasher with a system for atomization of the washing liquid which is characterized by high cleaning power.

[0007] These objects are achieved by the inventive dishwasher with the features in accordance with claim 1 as well as by a method with the features in accordance with claim 11. Advantageous developments of the present invention are identified in the subclaims 2 to 10 and 12 to 19.

[0008] According to the present invention a dishwasher is proposed with at least one washing compartment for receiving dishes to be washed, to which washing liquid is applied during washing, and an atomizing apparatus for atomization of washing liquid, especially for atomization of washing liquid mixed with active detergent substances, with the atomizing facility comprising an electrically operated ultrasound generator as well as a blower through which the atomized washing liquid is conveyed into the washing compartment.

[0009] The present invention thus provides a dishwasher with a system for atomization of the washing liquid which, by using an electrically-operated ultrasound generator or atomizer makes possible a low-cost system for effective vaporization and distribution of washing liquid as well as active detergent substances in the washing compartment of the dishwasher. The atomization of the washing liquid into the smallest possible droplet diameters results in the washing liquid and the active detergent substances dissolved within it being able to attack the dirt on the dishes more effectively, in that it can penetrate more effectively into the cracks and pores of the dirt. The even distribution of the vaporized washing liquid mixed with active detergent substances into the washing compartment by the blower guarantees an even action by the vaporized washing liquid and the active detergent substances dissolved within it on the dirt of the dishes. In this way on the one hand the efficiency of the active detergent substances is improved and on the other hand the cleaning power of the dishwasher overall is increased, resulting in a reduction in the required quantity of active detergent substances and thereby also a lower environmental impact.
The characteristics of the atomizer described above allow the droplet distribution of the volume to be atomized, the precision of the volume to be atomized and thereby the dosing of the active detergent substances in the washing liquid to be significantly improved. The ultrasound generator manages without the use of a nozzle, so that the danger of blockages or constrictions of the spray nozzles in the atomization device are avoided. This makes the system largely maintenance-free and durable as well as suitable for multiple use by way of recycling. Because of the low power demand of the piezo drive of the ultrasound generator the energy consumption is also reduced.

In a preferred embodiment of the present invention a piezoelectric atomizer is used as an electrically-driven vaporizer. Piezoelectric atomizers are based on piezo-electric substrates which are excited into oscillation electrically, with a liquid to be found on the surface of the piezoelectric substrate being atomized by the capillary waves thus produced. In such case a piezoelectric atomizer can be used in particular, in which a thin silicon membrane is made to oscillate by a piezoelectric ZnO layer, by which washing liquid is atomized by the membrane into droplets of different diameters.

For optimum operation of the inventive system for atomization of washing liquid the membrane of the atomizer or ultrasound generator are preferably wetted essentially evenly with washing liquid. This prevents the droplet diameters varying over a wide range on atomization of the washing liquid. The atomizer or ultrasound generator is preferably suited to be operated at a frequency of between 1 and 3 MHz and is adapted such that the droplets created by the atomization have a diameter of between 1 and 3 μm. The geometrical dimensions of the membrane, the liquid feed as well as the oscillation frequency employed are adapted accordingly as atomization parameters in order to create the desired droplet size.

The cracks and pores or capillaries which usually occur with dirt on dishes are between approximately 1 and 6 μm in size. The atomization of the washing liquid into droplets with a diameter between 1 and 3 μm enables said droplets to easily penetrate into the capillaries of the dirt, which speeds up the loosening and macerating of the dirt. If the liquid to be vaporized is supplemented by active detergent substances the cleaning agent, especially the surfactant, causes a reduction of the surface tension, typically by the factor 2 and thus leads to the formation of smaller droplets. This effect in its turn promotes the penetration of the vaporized washing liquid into the pores and cracks of the dirt. This wets the dirt with washing liquid and the active detergent substances dissolved therein with the atomized droplets and in the process the active detergent substances penetrate directly into the capillaries of the dirt.

In a further preferred embodiment of the present invention the atomizer facility includes a vaporization container in which the washing liquid or the fresh water is stored after atomization by the atomization facility and from which is conveyed at least partly into the washing compartment of the dishwasher by the blower. This enables the washing liquid mixed with active detergent substances to be initially vaporized homogeneously before being introduced via the blower into the washing compartment. This enables the washing liquid thus vaporized and mixed homogeneously with the added active detergent substances to act in a fast and effective manner if necessary on the dishes in the washing compartment.

Expediently an inlet opening of the blower is connected to the atomization container for this purpose, in which the atomized washing liquid is stored, while an outlet opening of the blower is connected to the inner chamber of the washing compartment. It is especially advantageous for the atomization facility to be arranged in the floor, roof and/or wall area of the washing compartment and on a side directed towards the inner chamber of the washing compartment to have at least one opening for the passage of the atomized washing liquid. Such an arrangement allows both a space-saving accommodation of the atomization facility and also short paths for example from the atomization container via the blower to the washing compartment.

The atomization facility is preferably connected to a fresh water pipe via which fresh water can be fed to the atomization facility. In accordance with a further preferred embodiment of the present invention the atomization facility features a cleaning agent feeding chamber into which active detergent substances, especially cleaning agents and/or rinsing agents can be introduced in order to come into contact with the washing liquid or with the fresh water. In this cleaning agent feed chamber the active detergent substances are expediently mixed with washing liquid and/or fresh water which allows the mixing-in or dissolving of the active detergent substances into the washing liquid by the operation of the ultrasound generator to be supported. Instead of the active detergent substances being added to the washing liquid in the atomization facility, the washing liquid or the fresh water can also be mixed with active detergent substances before being fed to the atomization facility.

Advantageously a dosing facility with at least one reservoir for active detergent substances is provided, which can supply cleaning agents and/or rinsing agents, in one or more portions of a given amount to the washing liquid. In such cases the active detergent substances are preferably introduced to the washing liquid from the dosing facility or the reservoir for the active detergent substances into the cleaning agent feed chamber of the atomization facility. This allows a precise dosing of the active detergent substances to be undertaken as required.

The above-mentioned objects are further achieved by a method for operating a dishwasher of the type described above, with the method comprising the following steps:

Feeding washing liquid and/or fresh water into the atomization facility,
Feeding and mixing in active detergent substances, especially cleaning and/or rinsing agents into the washing liquid or into the fresh water,
Atomizing or vaporizing the washing liquid mixed with active detergent substances or the fresh water mixed with the active detergent substances by means of an electrically-driven ultrasound generator and
Introducing or conveying the vaporized washing liquid or the vaporized fresh water into the washing compartment of the dishwasher by means of a blower.

The sequence and execution of these method steps described below is controlled by the preferably electronic program control of the dishwasher. The method in accordance with the invention allows the washing liquid to be initially mixed with active detergent substances, subsequently atomized by the ultrasound generator and then introduced and distributed via the blower into the washing compartment of the dishwasher. There the active detergent substances dissolved into the washing liquid can, as vapor with small drop-
let diameters, effectively penetrate into the cracks and pores of the dirt on the dishes, with the blower guaranteeing the even distribution of the vaporized washing liquid in the washing compartment. This produces the advantages already described.

[0024] In accordance with a preferred embodiment of the inventive method the feeding or mixing in of the active detergent substances, especially the feeding or mixing in of cleaning agents in the form of tabs or powder into the washing liquid, is supported by the operation of the ultrasound generator. The capillary waves generated by the ultrasound generator promote and accelerate a residue-free dissolving of the cleaning agent in the washing liquid.

[0025] Expediently the introduction of the vaporized washing liquid mixed with active detergent substances, especially cleaning agents, into the washing compartment is undertaken before a first washing process is executed. This allows the system to wait for a predetermined period of time between the introduction of the vaporized washing liquid mixed with active detergent substances into the washing compartment and the execution of a first washing process or rinsing process, in which the active detergent substances can act on dirt on the dishes. In this way the dirt on the dishes is pre-loosened and can be more easily and more quickly removed in the subsequent washing process.

[0026] Alternatively it is also possible to vaporize the washing liquid or fresh water initially without active detergent substances and before introduce it into the washing compartment before the first washing process is executed. This enables the washing liquid atomized into small droplets to act on the dirt of the dishes before the execution of the first washing process. In such cases the vaporized washing liquid penetrates into the cracks and pores of the dirt, loosens it in this way and enables it to be macerated. In the subsequent washing process the dirt can then be more easily and effectively removed from the dishes.

[0027] In a further preferred embodiment of the inventive method the vaporized washing liquid mixed with active detergent substances, especially mixed with rinsing agent, is introduced into the washing compartment before the execution of a rinsing process. In this way the rinsing agent can be distributed before the rinsing cycle in fine droplets evenly and in the desired dose onto the dishes in the washing compartment, which reduces the amount of rinsing water required.

[0028] It is also of advantage for the introduction of the vaporized washing liquid mixed with rinsing agent to be introduced into the washing compartment before the execution of a drying process. This enables the droplets of the washing liquid mixed with the rinsing agent to act as condensation carriers, so that the air humidity in the washing compartment falls rapidly during the drying process and the overall drying process is shortened.

[0029] Surfactants are generally used in cleaning processes as active detergent substances, which have the characteristic of lowering the surface tension of liquid and thus of enhancing the cleaning effect. The active detergent effectiveness of the surfactants depends on a large extent on their type and on their concentration in the cleaning agent solution. In a further preferred embodiment of the inventive method the amount of active detergent substances supplied to the washing liquid or the fresh water before atomization by the atomization facility in the washing compartment of the dishwasher is therefore able to be controlled.

[0030] The present invention will be explained below in greater detail taking into account the enclosed drawings with reference to a preferred exemplary embodiment. The figures are as follows:

[0031] FIG. 1 a cross-section through an atomization facility for use in a dishwasher in accordance with a preferred embodiment of the present invention in the operating state during a cleaning process;

[0032] FIG. 2 a cross-section through an atomization facility for use in a dishwasher in the embodiment of the present invention shown in FIG. 1 in the operating state during a rinsing process; and

[0033] FIG. 3 a cross-section through an atomization facility for use in a dishwasher in the embodiment of the present invention shown in FIG. 1 in the operating state during a drying process.

[0034] FIG. 1 shows a cross-section through an atomization facility for use in a dishwasher in accordance with a preferred embodiment of the present invention in the operating state during a cleaning process. The atomization facility 1 comprises an electrically-operated ultrasound generator 2, which creates ultrasound with a frequency of between 1 and 3 MHz. The atomization facility 1 is connected to a fresh water line 8, via which fresh water is fed into the atomization facility 1. To this end the fresh water is introduced directly into a cleaning agent feeding chamber 3, into which cleaning agents 4 in the form of tabs or in powder form can be introduced.

[0035] The opening of the cleaning agent feeding chamber 3 can be opened via a hingeable flap 9, by the hingeable flap 9 being moved into an opening position as shown in FIG. 1. The hingeable flap 9 can also be hinged into an operating position as well as the opened position, in which the fresh water introduced into the atomization facility 1 via the fresh water feed 8 is drawn off and taken directly out of the atomization facility 1 again. As well as the cleaning agent, 4 rinsing agents 15 can also be introduced into the cleaning agent feeding chamber 3. In the cleaning agent feeding chamber 3 the active detergent substances 4, 15 are mixed with washing liquid and/or fresh water, with the mixing-in or dissolving of the active detergent substances into the washing liquid being supported by the operation of the ultrasound generator 2. Instead of the addition of the active detergent substances 4, 15 to the washing liquid in the atomization facility 1 the washing liquid or the fresh water can however already be mixed with active detergent substances before being introduced into the atomization facility 1.

[0036] The ultrasound generator 2 atomizes the washing liquid located in the cleaning agent feeding chamber 3. A washing compartment 11 is arranged on the atomization facility 1 so that the opening of cleaning agent feeding chamber 3 comes out into a recess in the wall 10 of the vaporization container 11, so that the vaporized washing liquid can still get from the cleaning agent feeding chamber 3 during the atomization by the ultrasound generator 2 with an opened flap 9 directly into the vaporization container 11.

[0037] From the vaporization container 11 the atomized washing liquid will be conveyed via a blower 12 into the washing compartment 11 of the dishwasher. In this way with washing liquid mixed with active detergent substances 4, 15 can be initially vaporized homogeneously before being introduced via the blower 12 into the washing compartment of the dishwasher. This enables the washing liquid thus vaporized and homogeneously mixed with the added active detergent substances 4, 15 to be applied rapidly and effectively if nec-
necessary to the dishes in the washing compartment and to act on said dishes. To this end a suction opening 13 of the blower 12 is connected to the washing compartment 11 and an outlet opening 14 of the blower is connected to the inner chamber of the washing compartment.

[0038] The atomization facility 1 is equipped with a dosing facility 5 which has a reservoir 7 for active detergent substances, in which cleaning agents and/or rinsing agents 7 can be stored. Via a dosing mechanism with a valve 6, the active detergent substances held in the reservoir 7 are introduced as required in one or more portions of any given amount into the cleaning agent feeding chamber 3 and mixed there with the washing liquid or with fresh water. This enables a precise dosing of the active detergent substances 4, 15 into the washing liquid to be achieved.

[0039] FIG. 1 shows the atomization facility 1 in the operating state before or before a cleaning process. To support cleaning, cleaning agents in the form of tabs 4 or in powder form are put into the cleaning agent feeding chamber 3 and initially dissolved there with fresh water or washing liquid. The initial dissolving is speeded up by the ultrasound generator 2 by means of ultrasound. The solution produced is vaporized via the ultrasound generator 2 and introduced into the washing compartment 11. From there the vaporized washing liquid is conveyed via the blower 12 into the washing compartment and is distributed evenly there. The application of vaporized washing liquid to the dishes located in the washing compartment will pre-dissolve and macerate the dirt on the dishes. Since the vaporized washing liquid has cleaning agents added to it, the surface tension of the washing liquid is typically lowered by the factor 2, which leads during atomization to formation of small diameters of the droplets produced and additionally improves their penetration into the dirt. This allows the dirt of the dishes to be more efficiently removed in a subsequent cleaning process.

[0040] FIGS. 2 and 3 each show the same cross-section through the atomization facility shown by the embodiment of the present invention in FIG. 1 in the respective other operating states, so that in the following description merely deals in more detail with the differences between the figures. FIG. 2 shows a cross-section through the atomization facility in the embodiment of the present invention shown in FIG. 1 in the operating state during a cleaning process. By contrast with FIG. 1, in FIG. 2 the cleaning agent in the form of a tab 4 is already dissolved and mixed with the washing liquid. In the operating state of the atomization facility 1 shown in the figure, rinsing agent 15 is introduced through the opened valve 6 of the dosing mechanism 5 from the reservoir 7 into the cleaning agent feeding chamber 3 and is mixed there with the washing liquid or with fresh water.

[0041] In this way, to prepare for a rinsing process, the rinsing agent 15 is thinned with fresh water or rinsing water in the cleaning agent feeding chamber 3 and the mixture produced is vaporized by the ultrasound generator 2 by means of ultrasound and introduced via the blower 12 into the washing compartment 11, as described above. The fact that the droplets with added rinsing agent of the mist created apply the rinsing agent to the dishes achieves a reduction in the surface tension on the dishes, which speeds up the rinsing process. This makes it possible, to execute the rinsing process using only a small amount of water, instead of with a washing liquid fill of almost 2 l of water.

[0042] FIG. 3 shows a cross-section through the atomization facility in the embodiment of the present invention shown in FIG. 1 in the operating state for a drying process. To support the drying process fresh water without additives is vaporized in the cleaning agent feeding chamber 3 by the ultrasound generator 2 by means of ultrasound and blown by blower 12 into the inner chamber of the washing compartment. The droplets vaporized in this way now represent condensation carriers for the vapor in the inner chamber of the washing compartment and thus bring about an accelerated drying of the dishes. If the vapor is additionally blown onto a wall of the inner chamber of the dishwasher, this leads to a cooling down of the dishwasher chamber wall and thereby to an accelerated condensing of the water vapor on this wall. In this way the drying process is shortened, which saves both time and also energy.

LIST OF REFERENCE SYMBOLS

- Atomization facility
- Ultrasound generator
- Cleaning agent feeding chamber
- Cleaning agent
- Dosing facility
- Valve of the dosing facility
- Reservoir of the dosing facility
- Fresh water feed
- Flap of the atomization facility
- Wall of the vaporization container
- Dishwasher chamber
- Blower
- Inlet opening of the blower
- Outlet opening of the blower
- Rinsing agent
- Fresh water

21. A dishwasher comprising:
   at least one washing compartment for receiving dishes to be washed, to which washing liquid is applied during a washing operation; and
   an atomization facility for atomizing one of the washing liquid and the washing liquid mixed with active detergent substances,
   wherein the atomization facility includes:
   an ultrasound generator; and
   a blower that conveys the atomized washing liquid into the washing compartment.

22. The dishwasher as claimed in claim 21, wherein the atomization generator is arranged in a floor area of the dishwasher.

23. The dishwasher as claimed in claim 21, wherein the ultrasound generator includes a piezoelectric atomizer.

24. The dishwasher as claimed in claim 23, wherein the piezoelectric atomizer includes a thin silicon membrane having a coating made from a piezo-electric material.

25. The dishwasher as claimed in claim 21, wherein the blower conveys one of the washing liquid and fresh water.

26. The dishwasher as claimed in claim 21, wherein a suction opening of the blower is connected to the washing compartment, and
   wherein an outlet opening of the blower is connected to an inner chamber of the washing compartment.

27. The dishwasher as claimed in claim 21, wherein the atomization facility is arranged in one of a floor, a ceiling, and a wall area of the washing compartment, and
wherein a side directed towards an inner chamber of the washing compartment has at least one opening that allows the atomized washing liquid to pass through.

28. The dishwasher as claimed in claim 21, comprising:
   at least one fresh water line that supplies fresh water to the atomization facility.

29. The dishwasher as claimed in claim 21, wherein the atomization facility includes:
   a cleaning agent feeding chamber, wherein the active detergent substances are introduced into
   the cleaning agent feeding chamber with one of the washing liquid and fresh water.

30. The dishwasher as claimed in claim 29, wherein the active detergent substances include one of a cleaning agents
   and rinsing agents.

31. The dishwasher as claimed in claim 29, wherein the active detergent substances are mixed with one of the washing
   liquid and the fresh water in the cleaning agent feeding chamber.

32. The dishwasher as claimed in claim 21, comprising:
   a dosing facility having at least one reservoir for active detergent substances, the dosing facility configured to
   dispense one of cleaning agents and rinsing agents.

33. The dishwasher as claimed in claim 21, wherein the ultrasound generator operates at an excitation frequency of
   1-3 MHz such that droplets having a diameter of substantially
   1-3 µm are created.

34. A method for operating a dishwasher as claimed in claim 21, the method comprising:
   feeding one of the washing liquid and fresh water into the atomization facility;
   feeding and mixing the active detergent substances into the one of the washing liquid and the fresh water;
   one of atomizing and vaporizing one of the washing liquid mixed with the active detergent substances and the fresh
   water mixed with the active detergent substances by the ultrasound generator;
   and
   one of introducing and conveying the one of the vaporized washing liquid and the vaporized fresh water into the
   washing compartment of the dishwasher by the blower, wherein the ultrasound generator is an electrically-operated
   ultrasound generator.

35. The method for operating a dishwasher as claimed in claim 34, wherein the active detergent substances include one of
   cleaning agents and rinsing agents.

36. The method for operating a dishwasher as claimed in claim 35, wherein the vaporized washing liquid mixed with
   the active detergent substances having cleaning agents is introduced in the washing compartment before a first washing
   process is carried out.

37. The method for operating a dishwasher as claimed in claim 35, wherein the vaporized washing liquid mixed with
   active detergent substances having rinsing agents is introduced into the washing compartment before a rinsing process
   is carried out.

38. The method for operating a dishwasher as claimed in claim 35, wherein the vaporized washing liquid mixed with
   active detergent substances having rinsing agents is introduced into the washing compartment before a drying process
   is carried out.

39. The method for operating a dishwasher as claimed in claim 34, wherein a specific period of time in which the active
detergent substances act on dirt on dishes in the washing compartment of the dishwasher is between the introduction of
the vaporized washing liquid mixed with active detergent substances into the washing compartment and an execution of
one of a first washing process and a rinsing process.

40. The method for operating a dishwasher as claimed in claim 34, comprising:
   controlling an amount of active detergent substances which is supplied to the one of the washing liquid and the fresh
   water before atomization by the atomization facility in the washing compartment of the dishwasher.

41. The method for operating a dishwasher as claimed in claim 34, comprising:
   controlling an inflow and an amount of the fresh water being fed to the atomization facility.

42. The method for operating a dishwasher as claimed in claim 34, wherein an operation of the ultrasound generator
   facilitates one of the feeding and the mixing of the active detergent substances into the one of the washing liquid and
   the fresh water.

43. The method for operating a dishwasher as claimed in claim 35, wherein an operation of the ultrasound generator
   facilitates one of the feeding and the mixing of the active detergent substances having cleaning agents into the one of
   the washing liquid and the fresh water.

44. The method for operating a dishwasher as claimed in claim 34, wherein the fresh water is mixed with the active
detergent substances before being fed to the atomization facility.

45. The method for operating a dishwasher as claimed in claim 35, wherein the fresh water is mixed with the active
detergent substances having the one of the cleaning agents and rinsing agents before being fed to the atomization facility.