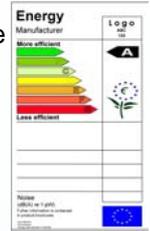


Background

The energy label classifies dishwashers by energy consumption, cleaning and drying performance. The cleaning performance measures visually the ability to clean the dishes from foodstuffs.



Residues

Residues neither from chemical origin, like cleaning agents or rinse aids, nor from organic origin, like microorganisms, are not included as they are not visible in an inspection of a single crockery (according to the relevant standard EN 50242).

As there are consumers concerns about residues, there is the necessity to find suitable detection and appraisalment methods for chemical and also microbiological residues on cleaned dishes because of new developments in the last years:

- innovative dishwashers, new programs
- lower temperatures, less water use
- new cleaning agents
- liquids, powders, tablets
- concentrates, antibacterials, 3in1-tabs



Factors, influencing residues on cleaned dishes:

- consumer's technique to wash up
- type of machine, cleaning program
- cleaning agent, rinse aid
- kind and age of soil
- amount and temperature of water



First screening tests started in April 2003.

Microbiological investigation

standard-soil
(minced meat, oat flakes, spinach, egg yolk)
EN 50242



samples „before“ (contact plate)



dishwashing: test persons, machines



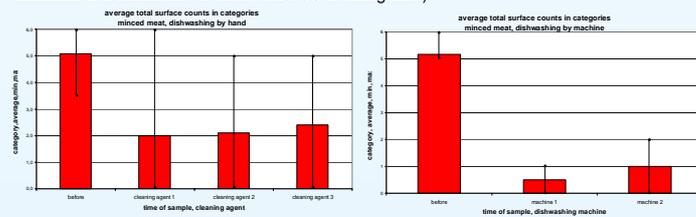
samples „after“ (3 cleaning agents)



First results – Microbiology

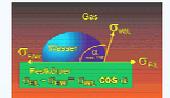
On washed dishes total surface counts (TSC) are reduced. There are differences between the three cleaning agents when washed by hand. The number of TSC decreases more when dishes are washed by machine, differences between the tested machines are existing (Fig.1 representative for all kinds of soil).

Fig.1: Average total surface counts (TSC) in categories on dishes soiled with minced meat, before and after dishwashing, left figure: by hand, right figure: by machine (lines show the minimum and maximum of observed TSC in categories)



Chemical investigation

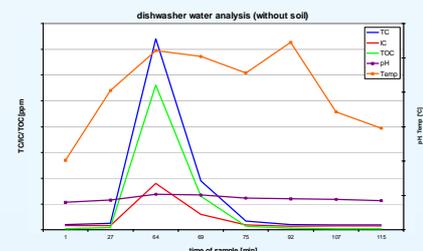
- Contact angle measurements, with 0,5µl water drop (Pic.1)
- Preparing: plates washed by
 - hand, clear water (c.w.) (Pic.2)
 - hand, 3g cleaning agent/5l (Pic.3)
 - hand, 6g cleaning agent/5l (Pic.4)
 - machine, reference cleaner and rinse aid (Pic.5)



Pic.1: 0,5µl water drop; pic. 2 – 5: drops behaviour on prepared plates (copyright Barthlott)

- Total organic carbon (TOC), pH, temperature of waste water from one dishwashing machine (Fig.2)

Fig.2: Results from TC-, IC-, TOC-, pH- and temperature-measurements of the waste water of a whole cleaning process from a dishwashing machine loaded with clean dishes



Outlook

More investigations have to be made. Different dishwashing situations (by hand and machine) have to be qualified. More methods to detect chemical residues have to be searched out. Correlations have to be found.

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