

## Maximum simplicity and cost saving in analysing surfactants

The Italian 152/2006 law foresees wastewater outlet limits for the → *total surfactants*. These limits are set on 2 mg/l for total surfactants by discharging into a surface water and 4 mg/l by discharging into a public waste water treatment plant. This means that each wwtp, industrial or municipal, has to analyse surfactants divided into their components: → *anionic, non-ionic and cationic surfactants*. Official standard methods are prescribed for two species (anionic and non-ionic surfactants), but they are very time consuming, complicated and dangerous due to the chlorinated solvents used. Therefore HACH LANGE developed three → *cuvette tests* to help customers in managing these kind of analysis and solving their purpose.



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**LANGE**

# Measuring surfactants



"Many problems are just a vague memory since we started using HACH LANGE instruments and cuvette tests. My colleagues Elena Montaini and Renata Giusti now regularly use the LANGE cuvette tests for determining COD, total nitrogen, phosphorus and surfactants. Even all samples are examined for ARPAT (local authority laboratory) control, with the official method have produced perfectly comparable results. In particular, we are grateful to HACH LANGE for having brilliantly solved the problem of determining total surfactants, whether they are cations, anions or non-ionic, a group that is being increasingly used. The limits set by the Casolino laboratory are on average 12 mg/l of total surfactant in all samples coming from the plant inlet, descending below 2 mg/l at the outlet, as foreseen by law."

Dr Francesca Guiducci  
Quality Manager  
NUOVE ACQUE

## Background

When a company manages 70 purification plants in 57 municipalities divided into five areas, the responsibility of providing an efficient service for the population is truly a huge one. So the laboratory that carries out control tests on the plant itself and on the water coming out of the plant must be rapid and efficient. The LANGE cuvette tests are a definite help for these purposes. The central laboratory "Nuove Acque" in Arezzo, Italy, a company that belongs to the French group Suez Ondeo, is located in the Casolino area, a charming spot in the Tuscan countryside, although it stands next to one of the main purification plants for wastewater for the city and province of Arezzo.

The plant serves 90,000 equivalent inhabitants, but the laboratory is also used for testing samples from another 70 plants managed by Nuove Acque. Each plant requires three weekly tests on the outflow water, for all the parameters foreseen by 152/2006 law follower from the previous Italian 152/1999 and from 91/271/CEE; in addition, in the Casolino laboratory, the parameters used to make the plants work are controlled.

As one can see, this means a large quantity of tests, that were traditionally carried out with analytical methods that presented a range of problems and also considerable cost. Anyone who works in a laboratory knows them, but it is worth remembering them.

## Traditional method

A totally manual, traditional test requires long times and a large consumption of glassware, that takes up a lot of room and is often broken. It must also be washed thoroughly, taking up more time and there is a possibility of error, due to the accidental dragging of pollutants; reagents are also expensive and take up space.

One must also consider the environmental risk for operators who handle large quantities of solvent and reagents and the consequent need to dispose of large amounts of used solvents and reagents after the test, with all the bureaucratic implications involved in managing them.

## Analysis with LANGE cuvette tests

HACH LANGE has made a decisive contribution to solving this problem by introducing its cuvette tests. This company has in fact used its technical skill and capabilities to automate and miniaturise the official procedures foreseen by the legislation into one signal instrument, thus making the laboratory's work easier.

In order to solve customer problems in terms of reagent disposal, HACH LANGE offers since years an useful service of waste disposal throughout its enviromental center. Another large problem solved for the laboratories. The following example shows how comfortable and fast measuring surfactants can be.

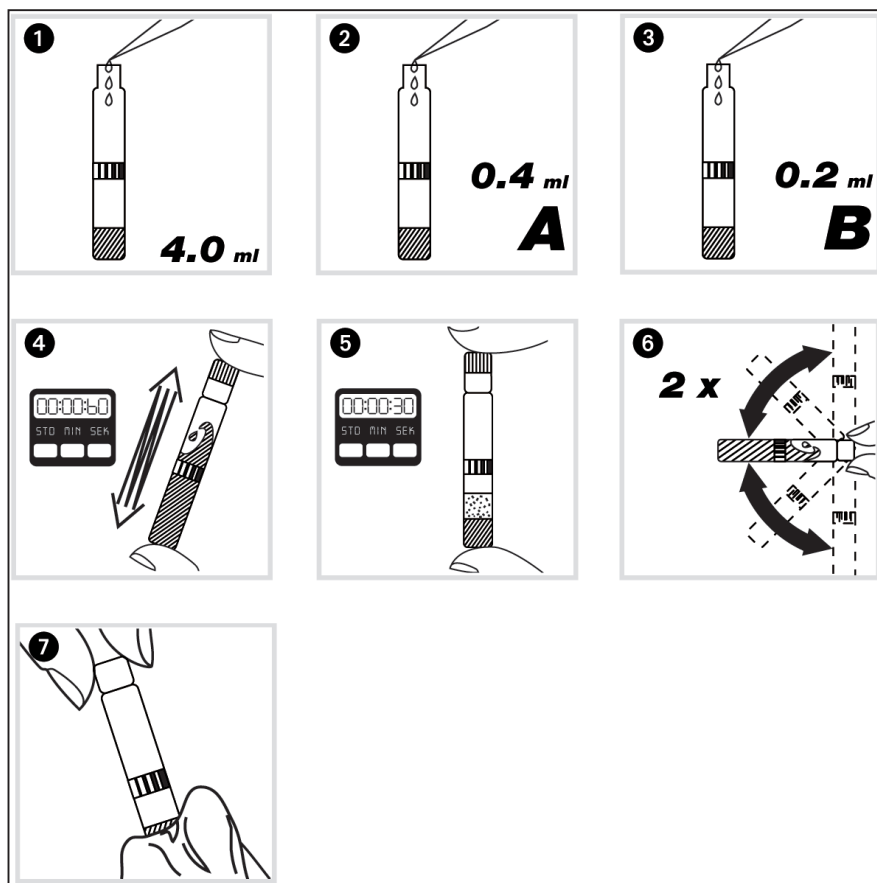


Fig. 1: Handling the cuvette test LCK332 for anionic surfactants

### Simple procedure for anionic surfactants with LANGE cuvette test

- Pipette the indicated amount of sample into the single-use cuvette, then add solvent (2) and reagent (3).
- Close cuvette with top and shake for 60 seconds.
- Allow phases to separate for 30 seconds.
- Gently invert the cuvette twice.
- Clean the outside carefully and evaluate in a HACH LANGE photometer.

### Considerably reduced costs

Table 1 shows a comparison with relative costs when carrying out traditional analysis and when carrying out analysis with LANGE cuvette tests. As can be seen in the table, the total cost of the test is about 50 % less if carried out using cuvette tests. In particular, in one year the company NUOVE ACQUE carries out about 1,500 tests on total surfactants using LANGE cuvette tests (anionic, non-ionic and cationic) thus saving at least 20,000 Euro per year in addition to operator time (and we are only talking about surfactants!).

### Undeniable results

An excessive presence of surfactants can be harmful for the plant, slowing down sludge decantation. The traditional procedure is once again lengthy and tiresome and foresees extraction by a harmful substance such as chloroform. Thanks to the LANGE cuvette tests, instead, everything is easier, faster, cleaner and less expensive. At the same time the results of the cuvette tests are equal with the standard methods. Demonstrated e. g. by several independent round robins.

	Costs (€) official test	Costs (€) LANGE cuvette test
Reagents	1.00	4.32
Glassware	0.10	-
Handling	3.00	-
Test handling	4.00	0.50
QC	0.50	-
Washing and disposal	0.40	0.00
Total	9.00	4.82

Table 1: Comparison of cost for a single surfactant analysis in Euro

# Surfactant analysis with HACH LANGE

## Overview of LANGE cuvette tests for analysing surfactants

Surfactants	Cuvette test	Measuring range	Method	Hazard code
Anionic	LCK332	0.2 - 2.0 mg/l	MBA	Xn
Cationic	LCK331	0.2 - 2.0 mg/l	CTAB	F, Xn
Non-ionic	LCK333	0.2 - 6.0 mg/l	TBPK, CTAS	Xn
Non-ionic	LCK334	0.1 - 20 g/l	TBPK, CTAS	Xn
Non-ionic	LCK433	6 - 200 mg/l	TBPK, CTAS	Xn



Fig. 2: LANGE cuvette test LCK433 for non-ionic surfactants



Fig. 3: DR 3800 sc spectrophotometer with barcode reading system (IBR), TFT colour display, touchscreen etc. for 230 preprogrammed HACH LANGE methods and 50 user-programmed methods.

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### Hazard codes for LCK331-334 and LCK433



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