

## Cationic surfactants

0.2 – 2.0 mg/L Cetyltrimethylammonium bromide

### Principle

Cationic surfactants react with bromophenol blue to form complexes, which are extracted in chloroform and evaluated photometrically.

### Range of Application

Preliminary analysis of surface water, waste water, process control

### Storage Information

The test reagents are stable at +15 to +25°C up to the expiry date given on the package.

### Interferences

The ions listed in the table have been individually checked up to the given concentrations. Cumulative effects and the influence of other ions have not been determined by us. There is no interference from:

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**2000 mg/L:** Cl<sup>-</sup>, Na<sup>+</sup>

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**1000 mg/L:** K<sup>+</sup>, SO<sub>4</sub><sup>2-</sup>, NO<sub>3</sub><sup>-</sup>

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**500 mg/L:** CO<sub>3</sub><sup>2-</sup>, Ca<sup>2+</sup>

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**200 mg/L:** NH<sub>4</sub><sup>+</sup>, PO<sub>4</sub><sup>3-</sup>

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**100 mg/L:** Mg<sup>2+</sup>, NO<sub>2</sub><sup>-</sup>, S<sub>2</sub>O<sub>8</sub><sup>2-</sup>

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**50 mg/L:** Fe<sup>2+</sup>, Fe<sup>3+</sup>, Ni<sup>2+</sup>, Zn<sup>2+</sup>, Cu<sup>2+</sup>, H<sub>2</sub>O<sub>2</sub>

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**25 mg/L:** SO<sub>3</sub><sup>2-</sup>, S<sub>2</sub>O<sub>3</sub><sup>2-</sup>

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**10 mg/L:** Cr<sup>3+</sup>, Cr<sup>6+</sup>, Cl<sub>2</sub>

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Anionic surfactants cause low-bias results.

The measurement results must be subjected to plausibility checks (dilute and/or spike the water sample).

### pH/Temperature

The pH of the water sample must be between pH 4 and pH 9. The given factors apply at a reaction temperature of 22°C.

***In case of not working at the right recommended temperature an incorrect result may be obtained.***

### Safety Advice

On grounds of quality and reliability, the analysis should be carried out only with original Dr. Lange accessories.

### Note

The change indicated by the new colour of the working procedure concerns a ***change of the evaluation*** and a ***change of factor for all types of photometers.***

## Applies to all types of photometer

## Cationic surfactants

Edition 10/2011

Insert sample cuvette as blank-value cuvette in the photometer, before adding the water sample and reagents (see evaluation)

Pipette into the cuvette test	
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Water sample	4.0 mL
Buffer solution A (LCK 331 A)	0.4 mL
Reagent B (LCK 331 B)	0.2 mL

Close the cuvette. Holding it between the screw cap and the base, shake it for **2 min** (not too vigorously). Then leave the cuvette in an upright and stable position for at least **30 seconds** until phase separation is complete.

**Invert** the cuvette **twice carefully**, clean the outside thoroughly, then evaluate.

**Attention:**

Depending on the ambient temperature, slight turbidity may appear in the chloroform phase in the course of time. This can be eliminated by warming the cuvette briefly (for example, by holding it in the hand).

## Cationic surfactants

Edition 10/2011

## Evaluation

1. Select »Barcode Programs«.
2. Select test number (see below).
3. Control number must be **1**.
4. Insert sample cuvette (**without** water sample and reagents) and press »Read 1«.
5. Insert sample cuvette (**with** water sample and reagents) and press »Read 2«.

Parameter	Test-No.	Meas. range
Cationic surfactants (Cat. surf.)	331	0.2 – 2.0 mg/L

## Data table

## LCK 331

LP2W	02/1999
Cat. surf. • $F_1 = -5.96$ • $F_2 = 5.96$ • $K = 0.1$	
CADAS 30/30S/50/50S	02/1999
Cat. surf. • $\lambda$ : 413 nm • Pro.: 1 • $F_1 = -5.769$ • $F_2 = 5.770$ • $K = 0.011$	
ISIS 6000/9000	02/1999
Cat. surf. • $\lambda$ : 405 nm • Pro.: 1 • $F_1 = -6.009$ • $F_2 = 6.009$ • $K = 0.08$	
CADAS 100 / LPG 158	02/1999
Cat. surf. • $\lambda$ : 414 nm • $F_1 = -5.79$ • $F_2 = 5.79$ • $F_3 = 0.110$	
CADAS 100 / $\geq$ LPG 210	02/1999
Cat. surf. • $\lambda$ : 414 nm • $F_1 = -5.79$ • $F_2 = 5.79$ • $K = 0.110$	
CADAS 200 Barcode / Basis	02/1999
Cat. surf. • E1W1.M.E2W1 • $C1 = (E2-E1)*F1-F2$ • $W1 = 414$ nm • $F1 = 5.823$ • $F2 = -0.090$	

## LASA 1 / plus

## LCK 331

## Cationic surfactants

Edition 02/1999

## Evaluation

1. Press "Mode" key.
2. Insert program filter **410 nm**.
3. Select test with "Mode" key.  
Control number must be **1\*** (see below).
4. Insert sample cuvette (**without** water sample and reagents).
5. Insert sample cuvette (**with** water sample and reagents).

Parameter	Display	Meas. range
Cationic surfactants (Cat. surf.)	cTens LCK 331 1*	0.2 – 2.0 mg/L

## Cationic surfactants

Edition 02/1999

## Evaluation

1. Press any key.
2. Check program control number: **\_\_ : 42**
3. Select test with ↑ or ↓ key.  
Control number must be **1\*** (see below).
4. Insert sample cuvette (**without** water sample and reagents).
5. Insert sample cuvette (**with** water sample and reagents).

Parameter	Display	Meas. range
Cationic surfactants (Cat. surf.)	cTens LCK 331 1*	0.2 – 2.0 mg/L

## Cationic surfactants

Edition 02/1999

## Evaluation

1. Insert filter **440 nm**.
2. Select »Dr. Lange« mode.
3. Select test number (see below).
4. Control number must be **1**.
5. Insert sample cuvette (**without** water sample and reagents) and press green key.
6. Insert sample cuvette (**with** water sample and reagents) and press green key.

Parameter	Test-No.	Meas. range
Cationic surfactants (Cat. surf.)	331	0.2 – 2.0 mg/L

## Cationic surfactants

Edition 02/1999

## Evaluation

1. Insert filter **412 nm**.
2. Press "Null" (zero) key.
3. Insert sample cuvette (**without** water sample and reagents) and press "Extinktion" (extinction) key.  
Make a note of the display – **Ext. 1**
4. Insert sample cuvette (**with** water sample and reagents) and press "Extinktion" (extinction) key.  
Make a note of the display – **Ext. 2**

## Calculation of the Surfactants Concentration

$$(\text{Ext. 2} \times 5.96) - (\text{Ext. 1} \times 5.96) + 0.1 = \text{mg/L cationic surfactants}$$

Parameter	Meas. range
Cationic surfactants (Cat. surf.)	0.2 – 2.0 mg/L

## Cationic surfactants

Edition 02/1999

## Evaluation

1. Insert program filter **412 nm**.
2. Press "Tests" key until display (see below) appears.
3. Control number must be **5**.
4. Press "Null" (zero) key.
5. Insert sample cuvette (**without** water sample and reagents) and press "Ergebnis" (result) key.
6. Insert sample cuvette (**with** water sample and reagents) and press "Ergebnis" (result) key.

*If more than one sample is to be measured start the next evaluation at point 5.*

Parameter	Display	Meas. range
Cationic surfactants (Cat. surf.)	Test _ _	0.2 – 2.0 mg/L

**Cationic surfactants**

Edition 02/1999

**Evaluation**

1. Insert sample cuvette (**without** water sample and reagents).
2. Insert sample cuvette (**with** water sample and reagents).

Parameter	Meas. range
Cationic surfactants (Cat. surf.)	0.2 – 2.0 mg/L

**Cationic surfactants**

Edition 02/1999

**Evaluation**

1. Check program control number:  
 \_\_ : 42 (CADAS 200)  
 \_\_ : 42 (ISIS 6000) ⇒ Select »CUVETTE TEST« mode.
2. Select test number (see below).
3. Control number must be 1.
4. Insert sample cuvette (**without** water sample and reagents) and press green key.
5. Insert sample cuvette (**with** water sample and reagents) and press green key.

Parameter	Test-No.	Meas. range
Cationic surfactants (Cat. surf.)	331	0.2 – 2.0 mg/L

**Cationic surfactants**

Edition 02/1999

**Evaluation**

1. Select »TEST« mode.
2. Select symbol (see below).
3. Select symbol » > «.
4. Check factors and measuring wavelength in memory »Mem«.
5. Close cuvette compartment – without cuvette – and press "NULL" (zero) key.
6. Insert sample cuvette (**without** water sample and reagents) and press "MESS" (measure) key.
7. Remove cuvette, close cuvette compartment – without cuvette – and again press "NULL" (zero) key.
8. Insert sample cuvette (**with** water sample and reagents) and press "MESS" (measure) key.

*If more than one sample is to be measured start the next evaluation at point 5.*

Parameter	Symbol	Meas. range
Cationic surfactants (Cat. surf.)	\$ 331	0.2 – 2.0 mg/L

**Cationic surfactants**

Edition 02/1999

**Evaluation**

1. Select »TEST« mode.
2. Select symbol (see below).
3. Control number must be 8.
4. Close cuvette compartment – without cuvette – and press "NULL" (zero) key.
5. Insert sample cuvette (**without** water sample and reagents) and press "MESS" (measure) key.
6. Insert sample cuvette (**with** water sample and reagents) and press "MESS" (measure) key.

*If more than one sample is to be measured start the next evaluation at point 5.*

Parameter	Symbol	Meas. range
Cationic surfactants (Cat. surf.)	331	0.2 – 2.0 mg/L