

# Silicic acid high measuring range

## Principle

In an acidic solution, dissolved silicic acid or silicates react with ammonium molybdate to form a yellow-coloured silicomolybdic acid. If a reducing agent is added a blue dye is formed.

## Range of Application

Boiler water, drinking water

## Storage Information

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

## Interferences

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

## Removal of Interferences

Phosphate interference can be eliminated by the addition of a spatula-tipfull of oxalic acid.

## pH/Temperature

The pH of the water sample must be between pH 3 and pH 10.  
The temperature of the water sample and reagents must be between 15 and 25°C.

## Safety Advice

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

**LCS 028**  


## Procedure **LCS 028**

**Applies to all types of photometer**

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**Edition 07/1998**

|                                                                                                                                                       |                      |                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------|
| Pipette into a plastic beaker                                                                                                                         |                      |                       |
|                                                                                                                                                       | <b>Meas. range I</b> | <b>Meas. range II</b> |
| Water sample                                                                                                                                          | 5 ml                 | 1 ml                  |
| Double-dist. water                                                                                                                                    | 20 ml                | 24 ml                 |
| Ammonium molybdate solution A (LCW 028 A)                                                                                                             | 1 ml                 | 1 ml                  |
| Mix, wait <b>3 min</b> , then pipette                                                                                                                 |                      |                       |
| Oxalic acid B (LCW 028 B)                                                                                                                             | 1 ml                 | 1 ml                  |
| Mix, wait <b>3 min</b> , then pipette                                                                                                                 |                      |                       |
| Reducing solution C (LCW 028 C)                                                                                                                       | 1 ml                 | 1 ml                  |
| Mix and allow to stand for <b>25 min</b> . Fill into the Dr. Lange round cuvette (LCW 906). Thoroughly clean the outside of the cuvette and evaluate. |                      |                       |

## Data table **LCW 028**

|                                                                                                    |                |
|----------------------------------------------------------------------------------------------------|----------------|
| <b>LP2W</b>                                                                                        | <b>07/1995</b> |
| <b>SiO<sub>2</sub></b> • F <sub>1</sub> = 0 • F <sub>2</sub> = 0.85 • K = 0                        |                |
| <b>Si</b> • F <sub>1</sub> = 0 • F <sub>2</sub> = 0.40 • K = 0                                     |                |
| <b>CADAS 30/30S/50/50S</b>                                                                         | <b>07/1995</b> |
| <b>SiO<sub>2</sub></b> • λ: 816 nm • Pro.: 1 • F <sub>1</sub> = 0 • F <sub>2</sub> = 0.66 • K = 0  |                |
| <b>Si</b> • λ: 816 nm • Pro.: 1 • F <sub>1</sub> = 0 • F <sub>2</sub> = 0.31 • K = 0               |                |
| <b>ISIS 6000/9000</b>                                                                              | <b>02/1999</b> |
| <b>SiO<sub>2</sub></b> • λ: 695 nm • Pro.: 1 • F <sub>1</sub> = 0 • F <sub>2</sub> = 1.512 • K = 0 |                |
| <b>Si</b> • λ: 695 nm • Pro.: 1 • F <sub>1</sub> = 0 • F <sub>2</sub> = 0.707 • K = 0              |                |
| <b>CADAS 100 / LPG 185</b>                                                                         | <b>07/1995</b> |
| <b>SiO<sub>2</sub></b> • λ: 816 nm • F = 0.66                                                      |                |
| <b>Si</b> • λ: 816 nm • F = 0.31                                                                   |                |
| <b>CADAS 100 / ≥ LPG 210</b>                                                                       | <b>07/1995</b> |
| <b>SiO<sub>2</sub></b> • λ: 816 nm • F <sub>1</sub> = 0.66                                         |                |
| <b>Si</b> • λ: 816 nm • F <sub>1</sub> = 0.31                                                      |                |

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**Evaluation**

1. Select menu "Stored Programs".
2. Select test number (see below) and touch "Start".
3. Insert blank-value cuvette (see procedure) and touch "Zero".
4. Insert sample cuvette and touch "Read".

**Calculation SiO<sub>2</sub>/Si:**

| Parameter                        | Test-No. | Meas. range I            | Meas. range I |
|----------------------------------|----------|--------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 22.24 | 0.8 – 20 mg/l |
| Silicon (Si)                     | 028      | displayed result x 22.24 | 0.4 – 10 mg/l |

| Parameter                        | Test-No. | Meas. range II            | Meas. range II |
|----------------------------------|----------|---------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 111.19 | 20 – 100 mg/l  |
| Silicon (Si)                     | 028      | displayed result x 111.19 | 10 – 50 mg/l   |

**Silicic acid** high measuring range

Edition 05/2006

**Evaluation**

1. Select menu "Stored Programs".
2. Select test number (see below) and touch "Start".
3. Insert blank-value cuvette (see procedure) and touch "Zero".
4. Insert sample cuvette and touch "Read".

**Calculation SiO<sub>2</sub>/Si:**

| Parameter                        | Test-No. | Meas. range I            | Meas. range I |
|----------------------------------|----------|--------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 22.27 | 0.8 – 20 mg/l |
| Silicon (Si)                     | 028      | displayed result x 22.27 | 0.4 – 10 mg/l |

| Parameter                        | Test-No. | Meas. range II            | Meas. range II |
|----------------------------------|----------|---------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 111.36 | 20 – 100 mg/l  |
| Silicon (Si)                     | 028      | displayed result x 111.36 | 10 – 50 mg/l   |

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**Evaluation**

1. Press any key.
2. Check program control number: **\_\_ : 28**
3. Select test with ↑ or ↓ key.
4. Insert blank-value cuvette (double-dist. water).
5. Insert sample cuvette.

**Calculation SiO<sub>2</sub>/Si:**

| Parameter                        | Display      | Meas. range I           | Meas. range I |
|----------------------------------|--------------|-------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | SiO2 LCW 028 | displayed result x 5.16 | 0.8 – 20 mg/l |
| Silicon (Si)                     | SI LCW 028   | displayed result x 5.16 | 0.4 – 10 mg/l |

| Parameter                        | Display      | Meas. range II           | Meas. range II |
|----------------------------------|--------------|--------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | SiO2 LCW 028 | displayed result x 25.78 | 20 – 100 mg/l  |
| Silicon (Si)                     | SI LCW 028   | displayed result x 25.78 | 10 – 50 mg/l   |

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**Evaluation**

1. Press "Mode" key and check program control number: **\_\_ : 18**
2. Insert program filter **690 nm**.
3. Select test with "Mode" key.
4. Insert blank-value cuvette (double-dist. water).
5. Insert sample cuvette.

**Calculation SiO<sub>2</sub>/Si:**

| Parameter                        | Display      | Meas. range I           | Meas. range I |
|----------------------------------|--------------|-------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | SiO2 LCW 028 | displayed result x 5.12 | 0.8 – 20 mg/l |
| Silicon (Si)                     | SI LCW 028   | displayed result x 5.12 | 0.4 – 10 mg/l |

| Parameter                        | Display      | Meas. range II           | Meas. range II |
|----------------------------------|--------------|--------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | SiO2 LCW 028 | displayed result x 25.59 | 20 – 100 mg/l  |
| Silicon (Si)                     | SI LCW 028   | displayed result x 25.59 | 10 – 50 mg/l   |

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**Evaluation**

1. **LASA 30** ⇒ Insert **800 nm** filter.  
Select »Dr. Lange« mode.
- LASA 100, XION 500** ⇒ Select »Dr. Lange« mode.
2. Select test number (see below).
3. Control number must be **8**.
4. Insert blank-value cuvette (double-dist. water) and press blue key.
5. Insert sample cuvette and press green key.

**Calculation SiO<sub>2</sub>/Si:**

| Parameter                        | Test-No. | Meas. range I            | Meas. range I |
|----------------------------------|----------|--------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 21.75 | 0.8 – 20 mg/l |
| Silicon (Si)                     | 028      | displayed result x 21.75 | 0.4 – 10 mg/l |

| Parameter                        | Test-No. | Meas. range II           | Meas. range II |
|----------------------------------|----------|--------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 108.7 | 20 – 100 mg/l  |
| Silicon (Si)                     | 028      | displayed result x 108.7 | 10 – 50 mg/l   |

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**Evaluation**

1. Insert filter **800 nm**.
2. Enter factor (see below) and store ↑.
3. Insert blank-value cuvette (double-dist. water) and press "Null" (zero) key.
4. Insert sample cuvette and press "Ergebnis mit Faktor" (result with factor) key.

**Calculation SiO<sub>2</sub>/Si:**

| Parameter                        | Factor | Meas. range I                    | Meas. range I |
|----------------------------------|--------|----------------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | 0.85   | (displayed result x 24.07) -0.40 | 0.8 – 20 mg/l |
| Silicon (Si)                     | 0.40   | (displayed result x 24.07) -0.19 | 0.4 – 10 mg/l |

| Parameter                        | Factor | Meas. range II                    | Meas. range II |
|----------------------------------|--------|-----------------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | 0.85   | (displayed result x 120.33) -2.02 | 20 – 100 mg/l  |
| Silicon (Si)                     | 0.40   | (displayed result x 120.33) -0.94 | 10 – 50 mg/l   |

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**Evaluation**

1. Insert program filter **800 nm**.
2. Press "Tests" key until display (see below) appears.
3. Control number must be **4**.
4. Insert blank-value cuvette (double-dist. water) and press "Null" (zero) key.
5. Insert sample cuvette and press "Ergebnis" (result) key.

**Calculation SiO<sub>2</sub>/Si:**

| Parameter                        | Display      | Meas. range I                    | Meas. range I |
|----------------------------------|--------------|----------------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | SI02 LCW 028 | (displayed result x 24.07) -0.40 | 0.8 – 20 mg/l |
| Silicon (Si)                     | SI LCW 028   | (displayed result x 24.07) -0.19 | 0.4 – 10 mg/l |

| Parameter                        | Display      | Meas. range II                    | Meas. range II |
|----------------------------------|--------------|-----------------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | SI02 LCW 028 | (displayed result x 120.33) -2.02 | 20 – 100 mg/l  |
| Silicon (Si)                     | SI LCW 028   | (displayed result x 120.33) -0.94 | 10 – 50 mg/l   |

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**Evaluation**

1. Select »TEST« mode.
2. Select test number (see below).
3. Control number must be **8** (SiO<sub>2</sub>) or **9** (Si).
4. Insert blank-value cuvette (double-dist. water) and press blue key.
5. Insert sample cuvette and press green key.

**Calculation SiO<sub>2</sub>/Si:**

| Parameter                        | Test-No. | Meas. range I            | Meas. range I |
|----------------------------------|----------|--------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 22.24 | 0.8 – 20 mg/l |
| Silicon (Si)                     | 028      | displayed result x 22.24 | 0.4 – 10 mg/l |

| Parameter                        | Test-No. | Meas. range II            | Meas. range II |
|----------------------------------|----------|---------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 111.19 | 20 – 100 mg/l  |
| Silicon (Si)                     | 028      | displayed result x 111.19 | 10 – 50 mg/l   |

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## Evaluation

1. Select »TEST« mode.
2. Select test number (see below).
3. Control number must be **8** (SiO<sub>2</sub>) or **9** (Si).
4. Insert blank-value cuvette (double-dist. water) and press key below »ZERO«.
5. Insert sample cuvette and press key below »MEAS.«.

## Calculation SiO<sub>2</sub>/Si:

| Parameter                        | Test-No. | Meas. range I            | Meas. range I |
|----------------------------------|----------|--------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 22.24 | 0.8 – 20 mg/l |
| Silicon (Si)                     | 028      | displayed result x 22.24 | 0.4 – 10 mg/l |

| Parameter                        | Test-No. | Meas. range II            | Meas. range II |
|----------------------------------|----------|---------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 111.19 | 20 – 100 mg/l  |
| Silicon (Si)                     | 028      | displayed result x 111.19 | 10 – 50 mg/l   |

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## Evaluation

1. Select »TEST« mode.
2. Select test number (see below).
3. Control number must be **2** (SiO<sub>2</sub>) or **6** (Si).
4. Insert blank-value cuvette (double-dist. water) and press blue key.
5. Insert sample cuvette and press green key.

## Calculation SiO<sub>2</sub>/Si:

| Parameter                        | Test-No. | Meas. range I            | Meas. range I |
|----------------------------------|----------|--------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 22.16 | 0.8 – 20 mg/l |
| Silicon (Si)                     | 028      | displayed result x 22.16 | 0.4 – 10 mg/l |

| Parameter                        | Test-No. | Meas. range II            | Meas. range II |
|----------------------------------|----------|---------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 110.81 | 20 – 100 mg/l  |
| Silicon (Si)                     | 028      | displayed result x 110.81 | 10 – 50 mg/l   |

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## Evaluation

1. Check program control number: **\_\_ : 38**
2. Select test number (see below).
3. Control number must be **9** (SiO<sub>2</sub>) or **2** (Si).
4. Insert blank-value cuvette (double-dist. water) and press blue key.
5. Insert sample cuvette and press green key.

## Calculation SiO<sub>2</sub>/Si:

| Parameter                        | Test-No. | Meas. range I            | Meas. range I |
|----------------------------------|----------|--------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 22.27 | 0.8 – 20 mg/l |
| Silicon (Si)                     | 028      | displayed result x 22.27 | 0.4 – 10 mg/l |

| Parameter                        | Test-No. | Meas. range II            | Meas. range II |
|----------------------------------|----------|---------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | 028      | displayed result x 111.36 | 20 – 100 mg/l  |
| Silicon (Si)                     | 028      | displayed result x 111.36 | 10 – 50 mg/l   |

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## Evaluation

1. Select »TEST« mode.
2. Select symbol (see below).
3. Check factors and measuring wavelength in memory »Mem« (**LPG 185**) or control number must be **8** (SiO<sub>2</sub>) or **9** (Si) (**LPG 210**).
4. Insert blank-value cuvette (double-dist. water) and press "NULL" (zero) key.
5. Insert sample cuvette and press "MESS" (measure) key.

## Calculation SiO<sub>2</sub>/Si:

| Parameter                        | Symbol | Meas. range I            | Meas. range I |
|----------------------------------|--------|--------------------------|---------------|
| Silicic acid (SiO <sub>2</sub> ) | 028 K  | displayed result x 22.30 | 0.8 – 20 mg/l |
| Silicon (Si)                     | 028    | displayed result x 22.30 | 0.4 – 10 mg/l |

| Parameter                        | Symbol | Meas. range II            | Meas. range II |
|----------------------------------|--------|---------------------------|----------------|
| Silicic acid (SiO <sub>2</sub> ) | 028 K  | displayed result x 111.51 | 20 – 100 mg/l  |
| Silicon (Si)                     | 028    | displayed result x 111.51 | 10 – 50 mg/l   |