NB: NEW!
The actual edition date is given with the procedure or evaluation. See also under "Note" (below).

Alcohol

Principle
The enzyme alcohol oxidase catalyses the following reaction:

$$\text{Ethanol} + H_2O + O_2 \xrightarrow{\text{Alcohol oxidase}} \text{Acetaldehyde} + H_2O_2$$

The resulting hydrogen-peroxide combines with aminophenazone and a benzoic acid derivative in the presence of peroxidase, which acts as a catalyst, to form a red quinoid dye.

$$H_2O_2 + \text{Aminophenazone} + \text{Benzoic acid derivative} \xrightarrow{\text{POD}} \text{red quinoid dye}$$

POD = Peroxidase

Range of Application
Spirits, beers, alcohol-free beers, fruit juices

Storage Information
The test reagents are stable at +2 to +8°C up to the expiry date given on the package.

Interferences
Oxidizing agents interfere with the determination. Reducing agents (e.g. ascorbic acid) do not interfere provided that concentrations in the dilution do not exceed 20 mg/L.
The measurement results must be subjected to plausibility checks (dilute and/or spike the water sample).

Removal of Interferences
Turbid samples must be filtered before the analysis is carried out (membrane filtration set LCW 904). Fruit juices that are highly acidic or have a high particulate content should be filtered and the pH should be adjusted. Samples that contain CO_2 must be degased for ***one minute*** while stirring before the analysis.

Special note
In the case of alcohol-free beers the recommended dilution level should not be exceeded, otherwise low-bias results may be obtained. The result obtained from the sample can, however, be checked for plausibility through more dilution levels (1 : 60, 1 : 70).

pH/Temperature
The pH of the sample must be between pH 2 and pH 6.
The sample and the reagents should therefore have a working temperature of 20°C.

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

CADAS 100 (LPG 185 / ≥ LPG 210)
If this test is not already stored in your instrument please ask your HACH LANGE Agency for programming instructions.

Note
The change indicated by the new edition date and the new colour of the working procedure concerns a ***change of the procedure and the dilution table***.

Applies to all types of photometer

Alcohol

Edition 99/02

Sample preparation

Approx. ***20 mL*** of distilled water (free of alcohol) should be introduced into a ***50 mL*** volumetric flask before the sample or the preliminary dilution according to the dilution table are pipetted into it. Then the flask is filled up to the ***50 mL*** mark with distilled water (free of alcohol).

Screw ***a DosiCap A*** (LCK 300 A) onto the cuvette and invert a few times.	
Into the same cuvette pipette	
diluted sample	0.2 mL
Close cuvette and invert a few times. After ***30 min*** invert again, thoroughly clean the outside of the cuvette and evaluate.	

Edition 99/02

Field of : application	**Fruit juices**	**Alcohol-free beer < 0.5 vol %**	**Low-alcohol "light beers", medium-gravity beers**	**Strong beer, wine, spirits**
Estimated alcohol content (g/L)	0.05 – 0.50	0.5 – 5.0	5 – 50	50 – 500
Estimated alcohol content (Vol%)	0.006 – 0.06	0.06 – 0.6	0.6 – 6.0	6 – 60
Dilution-factor	1 : 5	1 : 50	1 : 500	1 : 5000
Preliminary dilution *	none	none	5 mL sample	0.5 mL sample
Dilution *	10 mL sample	1 mL sample	1 mL preliminary dilution	1 mL preliminary dilution

**** Sample volume/preliminary dilution in a 50 mL measuring flask***

Conversion of the reading into vol %:
displayed result (g/L) x dilutionfactor x 0.126

LP2W	***94/03***
Alcohol • $F_1 = 0$ • $F_2 = 0.065$ • $K = 0$	
CADAS 30/30S/50/50S	***94/03***
Alcohol • λ: 490 nm • Pro.: 10 • $F_1 = -0.033$ • $F_2 = 0.033$ • $F_3 = 2.000$ • $K = 0$	
ISIS 6000/9000	***94/03***
Alcohol • λ: 500 nm • Pro.: 10 • $F_1 = -8.364$ • $F_2 = 6.700$ • $F_3 = 0.010$ • $K = 0$	
CADAS 100 / LPG 185	***94/03***
Alcohol • λ: 502 nm • F = 0.065	
CADAS 100 / ≥ LPG 210	***94/03***
Alcohol • λ: 502 nm • $F_1 = 0.065$	

Alcohol

Edition 94/03

Evaluation

1. Press "Mode" key and check program control number:
   __ : 28
2. Insert program filter **480 nm**.
3. Select test with "Mode" key.
4. Insert zero-solution cuvette.
5. Insert sample cuvette.

Parameter	**Display**	**Meas. range**
Alcohol	Alc. LCK 300	0.01 – 0.12 g/L

LASA 20 **LCK 300**

Alcohol

Edition 94/03

Evaluation

1. Press any key.
2. Check program control number: **__ : 32**
3. Select test with ↑ or ↓ key.
4. Insert zero-solution cuvette.
5. Insert sample cuvette.

Parameter	Display	Meas. range
Alcohol	Alc. LCK 300	0.01 – 0.12 g/L

LASA 30 **LCK 300**

Alcohol

Edition 94/03

Evaluation

1. Insert filter **480 nm**.
2. Select »Dr. Lange« mode.
3. Select test number (see below).
4. Control number must be **4**.
5. Insert zero-solution cuvette and press blue key.
6. Insert sample cuvette and press green key.

Parameter	Test-No.	Meas. range
Alcohol	300	0.01 – 0.12 g/L

LP1W, LKT **LCK 300**

Alcohol

Edition 94/03

Evaluation

1. Insert filter **500 nm**.
2. Enter factor (see below) and store ↑ .
3. Insert zero-solution cuvette and press ”Null“ (zero) key.
4. Insert sample cuvette and press ”Ergebnis mit Faktor“ (result with factor) key.

Parameter	Factor	Meas. range
Alcohol	0.065	0.01 – 0.12 g/L

LP2W **LCK 300**

Alcohol

Edition 94/03

Evaluation

1. Insert program filter **500 nm**.
2. Press ”Tests“ key until display (see below) appears.
3. Control number must be **2**.
4. Insert zero-solution cuvette and press ”Null“ (zero) key.
5. Insert sample cuvette and press ”Ergebnis“ (result) key.

Parameter	Display	Meas. range
Alcohol	Alcohol LCK 300	0.01 – 0.12 g/L

Alcohol

Edition 94/03

Evaluation

1. Insert zero-solution cuvette.
2. Insert sample cuvette.

Parameter	Meas. range
Alcohol	0.01 – 0.12 g/L

Alcohol

Edition 94/03

Evaluation

1. Check program control number:
   __ : 38 (CADAS 200)
   __ : 32 (ISIS 6000) ⇒ Select »CUVETTE TEST« mode.
2. Select test number (see below).
3. Control number must be **4**.
4. Insert zero-solution cuvette and press blue key.
5. Insert sample cuvette and press green key.

Parameter	Test-No.	Meas. range
Alcohol	300	0.01 – 0.12 g/L

Alcohol

Edition 94/03

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 **7 (LPG 210)**.
4. Insert zero-solution cuvette and press ”NULL“ (zero) key.
5. Insert sample cuvette and press ”MESS“ (measure) key.

Parameter	Symbol	Meas. range
Alcohol	300	0.01 – 0.12 g/L

Alcohol

Edition 94/03

Evaluation

1. Select »Barcode-programs«.
2. Select test number (see below).
3. Control number must be **4**.
4. Insert zero-solution cuvette and press ”Zero“.
5. Insert sample cuvette and press ”Read“.

Parameter	Test-No.	Meas. range
Alcohol	300	0.01 – 0.12 g/L