The ideal measuring range for every application

Introduction

COD is still the sum parameter that provides the most reliable and timely information about the oxygen depleting effects of **organic pollutants** in wastewater. Reservations concerning its determination were swept away long ago when operational analysis methods received **official recognition** (provided that AQA measures are documented). Measuring COD by means of the Hach® LCK Cuvette Test is **simple, reliable, affordable** and **environmentally responsible**. Ten practice related measuring ranges ensure top quality results and preliminary dilution of the sample is usually no longer necessary.

Definition and relevance of COD

According to ISO 15705 standard, COD is the amount of oxygen equivalent to the mass of potassium dichromate that reacts with the oxidisable substances in water under the working conditions of the method. Mercury sulphate, silver sulphate and sulphuric acid are specified as auxiliary reagents. The reaction time is 2 hours at 150 °C. The sample must be homogenised before the analysis is performed.

Chemical oxygen demand (COD), as a sum parameter for organic pollution, is an indispensable element of wastewater analysis. It is the most frequently mentioned monitoring parameter in European legislation and serves as a design basis for the construction and efficiency of sewage treatment plants.

Its rapid availability and the narrow scatter of the measurement results make it stand out against BOD. The often discussed TOC provides clear information about the proportion of carbon in the organic pollution, but not about the amount of oxygen needed for biodegradation.

COD analysis with Cuvette Tests

Principle

The Hach LCK Cuvette Tests are based on the same reaction principle as the standard. Only the quantities of sample and reagents, and the evaluation method (photometric instead of volumetric) are different. The Cuvette Test uses over 90 % less reagents than the standard method of determination.

Less work, more occupational safety

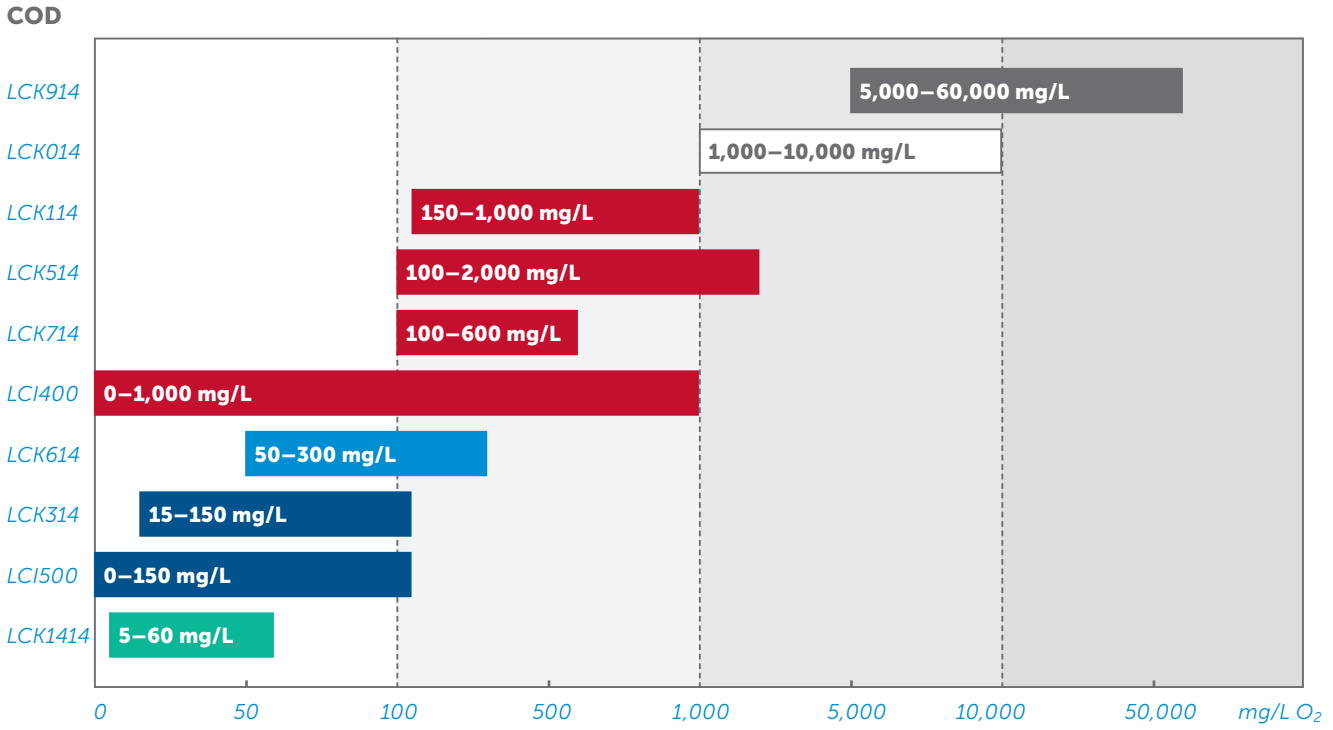
The determination of COD with a cuvette test could not be easier. The measurement cuvette already contains all the necessary chemicals in exactly measured amounts, and the user simply adds a defined amount of the homogenised sample.

For minimum effort and maximum quality of results, ten practice-related measurement ranges are available. This allows for direct COD determination from the homogenised original sample in nearly all cases. Thus eliminating the need for time-consuming, potentially incorrect dilution.

The closed cuvette is then heated for two hours at 150 °C in a dry thermostat. Anyone who wants a faster result can use the high-temperature HT200S thermostat, with which a complete COD analysis can be carried out within 35 minutes. The cuvette is then evaluated with a precalibrated Hach photometer. Since the reagents are predosed in exact known quantities in the cuvette and the heating is carried out in a closed system, there is a high level of safety, as contact with the chemicals is virtually eliminated.

Quality of the results

The results of the Hach LCK Cuvette Tests are comparable with those of the standard method. This has been confirmed over a number of years in comparative studies carried out by standard laboratories and by the results of official round robin tests. Operational analysis methods are therefore not only recognised in some European countries but are used officially for routine examinations (e.g. the Netherlands).



The Hach LCK COD range with 10 practice-related measuring ranges from 5 to 60,000 mg/L O_2.
GHS Hazard Codes for COD Cuvette Tests: GHS05, GHS06, GHS08, GHS09 (see page 4)

A prerequisite for recognition of measurement results, irrespective of whether operational or standard methods are used is always the implementation and documentation of Analytical Quality Assurance (AQA) measures, i.e. standard analyses, regular participation in round robin tests, etc..

Costs
Cost comparisons of operational analysis and standard analysis show that COD determinations with Cuvette Tests are clearly advantageous. For example, the switch to COD Cuvette Tests by the Dutch environment agency some years ago resulted in cost savings of 40 %.

Treatment and recycling
Ecologically the LCK Cuvette Test is far superior to the standard method. On the one hand, much smaller amounts of environmentally harmful chemicals are used, and on the other hand, a disposal service is available for used cuvettes for proper reprocessing. The mercury containing reagents are treated in a specially developed two-stage electrolysis plant in the certified Hach Environment Centre. The treatment ensures that mercury and silver are recovered.

Conclusions
COD is still one of the most important parameters in wastewater analysis. For assessing wastewater and water, and the control of sewage treatment plants the determination of COD with the LCK Cuvette Test System offers numerous advantages:

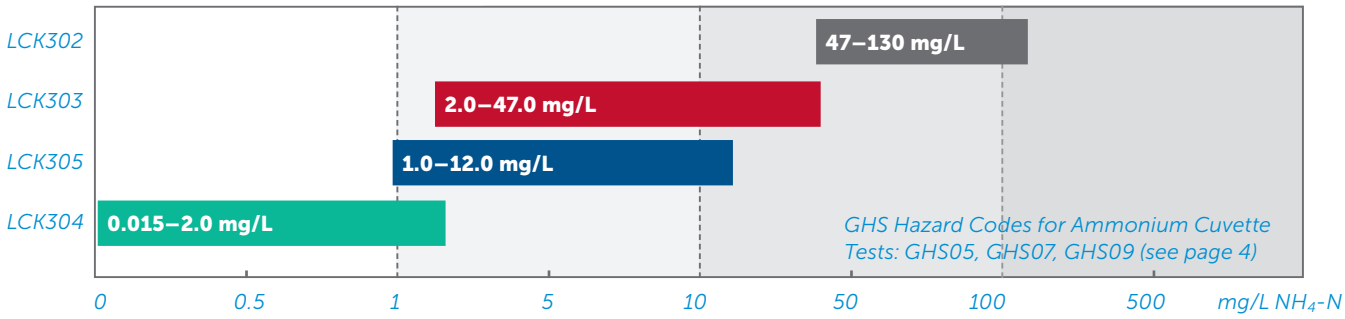
- Standard-compliant method
- Reliable and comparable measurement results
- 10 practice related measuring ranges
- Less work
- Increased occupational safety
- Affordable
- Disposal/recycling service for reprocessing of the used reagents

Comparison of the amount of chemicals used by the standard method and the cuvette test.

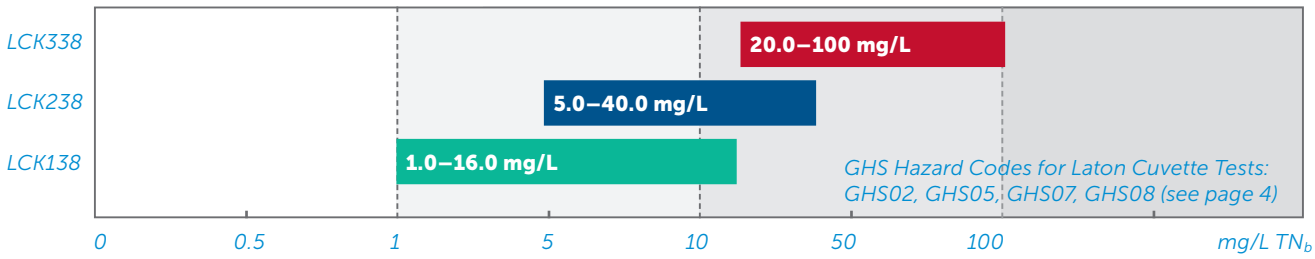
Nutrient parameters

In addition to COD, nutrients are important control parameters for wastewater stream monitoring and effluent compliance. LCK Cuvette Tests are also available for these parameters across multiple measuring ranges to cover the complete treatment process.

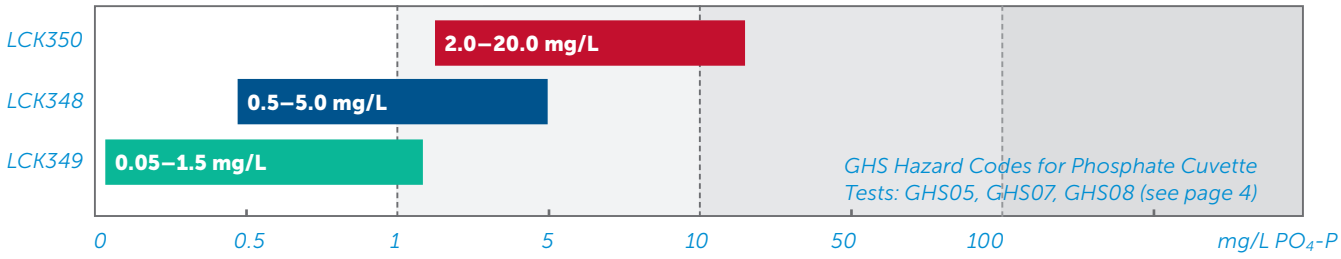
Ammonium



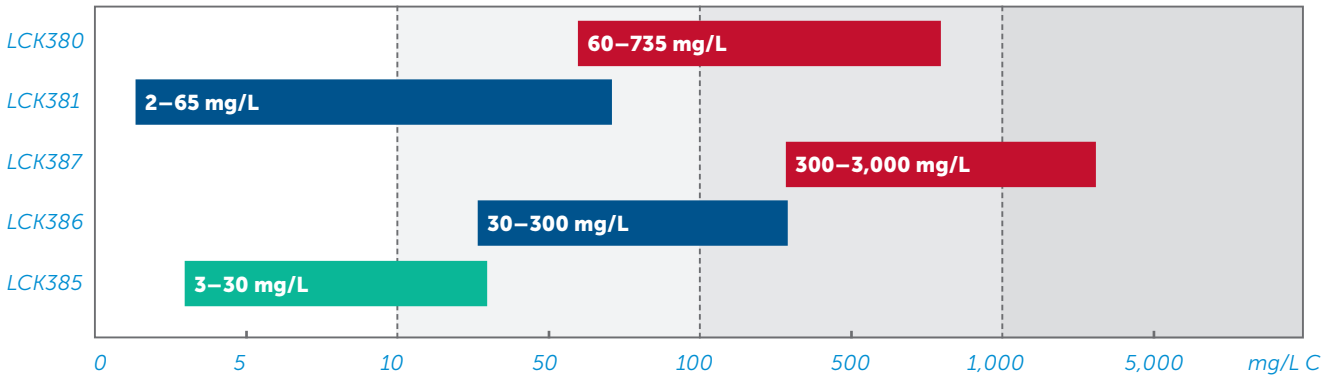
TN_b (Laton)



Phosphate



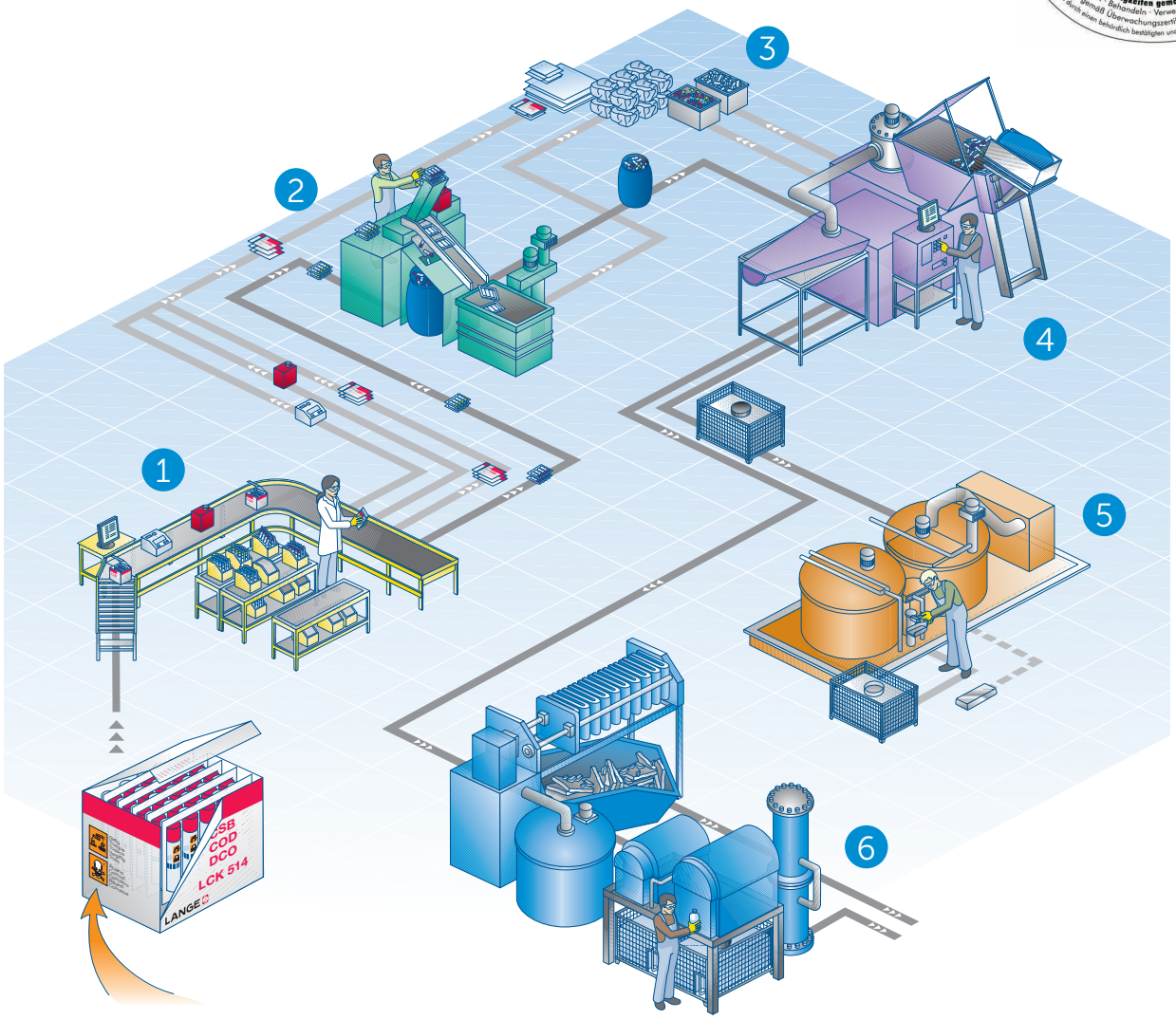
TOC



LCK380/381: difference method; GHS Hazard Codes: GHS03, GHS07, GHS08 (see page 4)
LCK387/386/385: purging method; GHS Hazard Codes: GHS07, GHS08 (see page 4)

The Hach Environment Centre

The Hach team in Duesseldorf, Germany, runs a state-of-the-art, certified recycling centre for used LCK Cuvette Tests and reagents from analysers. All machinery has been especially developed or adapted to meet the complex needs of separating reagents from boxes, cuvettes, labels and caps.



1 Registration and sorting
2 Separation of blisters and glass cuvettes
3 Recycling of packaging materials
4 Cuvette shredder
5 Electrolysis for COD reagents
6 Wastewater treatment

GHS Hazard Codes

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