Application Note AN-I-032

液态乳制品中的溶解氧、电导率和 pH 值

使用 914 pH计/溶解氧仪/电导率仪快速靠谱地进行单次测定

In the food industry, it is essential to determine and monitor certain quality parameters to guarantee consistency. This is especially important for liquid dairy products, which are subject to a strict cold chain. Both the dissolved oxygen (DO) and the pH value have proven to be reliable quality criteria.

Oxygen shortens the shelf life and influences the product quality (e.g., nutritional value, color, and flavor). The DO content depends on the salinity in the sample, which is automatically calculated and corrected by the 914 pH/DO/Conductometer during the parallel conductivity measurement.

Acidity is another important characteristic to measure in liquid dairy products. It can be checked easily using the pH value.

With the 914 pH/DO/Conductometer, all important quality criteria can be monitored with one device. Fast, safe, and reliable analysis for the food industry.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on raw milk (untreated and fresh), UHT skimmed milk with 0.1% fat, UHT milk with 1.5% fat, pasteurized milk with 3.5% fat, UHT coffee cream with 15% fat, UHT full-fat cream with 35% fat, and whey drink.

No sample preparation is required.

EXPERIMENTAL

The determinations are carried out with a 914 pH/DO/Conductometer equipped with an O_2-Lumitrode, conductivity measuring cell, and an iUnitrode. All sensors are pre-calibrated with appropriate standards.

An appropriate amount of sample is poured carefully (to omit entrainment of oxygen) into the sample beaker equipped with a magnetic stir bar.

The sensors are placed directly into the sample. The measurement is started and the corresponding parameters are measured until a stable value is reached. Afterwards, the sensors are removed and cleaned with deionized water.

Figure 1. 914 pH/DO/Conductometer equipped with an O2-Lumitrode, conductivity measuring cell, and iUnitrode (missing in the picture) for the determination of DO, K (conductivity), and pH in liquid dairy products.

Table 1. Summarized results for DO, conductivity (K), and pH value in several liquid dairy products.

Sample (n = 6)	DO in mg/L	K in mS/cm	pH value
Raw milk	5.81	4.978	6.65
UHT milk	5.86	5.024	6.74
Skimmed milk	0.87	5.119	6.76
Past. milk	10.65	4.868	6.76
Coffee cream	7.74	4.856	6.94
Full-fat cream	0.47	2.530	6.86
Whey drink	8.87	6.406	4.24

CONCLUSION

The 914 DO/pH/Conductometer is a fast, precise, and reliable all-in-one solution to determine the dissolved oxygen, conductivity, and pH value in liquid dairy products.
Accurate measurement of all listed parameters takes a few minutes. Thanks to the well-known Metrohm quality, the O_2-Lumitrode is completely maintenance-free while the Conductivity measuring cell and the iUnitrode are easy to use and robust for daily laboratory work.

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CONFIGURATION

914 pH/DO/Conductometer

便携式双通道 pH/DO/电导率测量仪,带智能测量输入端,用于对溶解的氧气/pH/mV/电导率进行测量/,带模拟测量输入端,用于对总溶解固体值/盐度和温度进行测量。

通过这种电池供电且带有支架板的测量设备,您便可以实现面向现场和在实验室中测量的装备。

- 数字测量输入端,用于 O2-Lumitrode 和智能 pH 电极
- 瑞士万通的 4 导线电导电极用模拟电导率测量输入端
- 内置电池组的实验室 pH/DO 和电导率测量仪
- 同时测量 pH 值和电导率
- 同时测量氧气和电导率
- 坚固实用的防水防尘外壳 (IP67),适合户外及实验室使用
- 背光 LCD 彩色显示屏,用于方便读取结果
- USB 接口,用于方便将数据从计算机导出到打印机上
- 更大的内存(10000 数据组)
- 引线保护型用户和专家模式,防止修改一些默认参数
- GLP 达标打印和数据导出,带用户 ID 和时间戳

O2-Lumitrode

用于测量溶解氧 (DO) 的光学传感器可以和一个 913 pH/DO Meter 或 914 pH/DO 电导率仪搭配使用。传感器的测量原理基于发光抑制。这种节省空间并免维护的传感器适用于以下领域的 DO 测量:

- 水的质量控制
- 污水处理工业
- 饮料制造
- 养鱼

传感器在交付的时候带有一个校正筒。

包含有对氧气敏感的发光体的测量帽(O_2 帽),可在需要时轻松更换。

c = 0.5 cm-1 Pt1000

带池常数的 4 线电导电极 c = 0.5 cm^{-1} (指导数值),集成有温度探针 Pt1000 和固定电缆,用于连接到 912/914 测量仪上。

得益于聚丙烯制成的坚固/不易破碎的塑料杆,该传感器可以承受极高的机械载荷,并适用于测量中等的电导率,例如:

- 饮用水
- 地表水
- 废水

iUnitrode Pt1000

集成了传感器数据存储芯片和 Pt1000 温度传感器的智能组合 pH 电极。该电极特别适用于:

- 用于较难的、粘性或碱性样品中的 pH 测量和滴定
- 温度升高的时候
- 长时测量的时候

固定磨口隔膜对污染不敏感。

参比电解质:c(KCl) = 3 mol/L,储存在储存溶液中。
替代方法:T>80° C 时的测量用参比电解质:Idrolyt,储存在 Idrolyt 中。
iTrodes 可用于 Titrando,Ti-Touch 或 913/914 米。