

METTLER TOLEDO APPLICATION NOTE

Dissolved Oxygen Measurement In Oceans, Lakes and Rivers

BACKGROUND

Pollutants in the waterways block sunlight and poison and kill aquatic plants and animals, thus interfering with the biological balance of the waterways. The body of water that formerly generated oxygen from the plants and animals now demands oxygen from the atmosphere. Consequently, the EPA monitors the level of water pollution.

Industries and sewage plants also monitor the pollution level of the waterway into which they discharge waste to ensure that they are meeting EPA standards.

An accepted indicator of overall water pollution is the level of dissolved oxygen, which is measured in parts per million (ppm). The level of dissolved oxygen in healthy waterways is near the saturation value, and the level of dissolved oxygen falls below the saturation value in proportion to the level of water pollution.

The saturation value of dissolved oxygen for a given waterway depends on the salt content and temperature of the water. Dissolved oxygen saturation values for sea water at various temperatures are listed in Table 1.

THE PROCESS

In a typical dissolved oxygen measurement the sensor is immersed in water. The water sample must flow past the sensing membrane at a speed of at least 1 ft per second for good measurement. The principle of measurement is amperometric: oxygen diffuses through a semi-permeable membrane and is reduced to hydroxyl ions by a small polarizing voltage. The resulting current produces a readout on the analyzer.

INSTRUMENTATION

The Mettler-Toledo Model 4050 Dissolved Oxygen Analyzer displays the oxygen level in ppm and provides a linear current or voltage signal for remote recording and controlling. The "air calibration" is a simple procedure. The recommended accompanying sensor and housing is the Mettler-Toledo InPro[®] 6050 Dissolved Oxygen Sensor and the InDip[®] housing.

PRODUCTS

4050 Dissolved Oxygen Analyzer

- Economically priced, full featured transmitter
- Large, easy-to-read LCD allows quick view of information
- Two relays as limit contacts with delay timer to minimize false alarms and one relay as alarm or wash contact

InPro® 6050 Dissolved Oxygen Sensor

- Rugged, plastic sensor design for long life and low maintenance
- Integrated RTD for automatic temperature compensation
- Unique Teflon® coated membrane prevents fouling
- IP66, IP67 and IP68 rated VarioPin connector for quick cable disconnect

InDip® 500 Series Immersion Housings

- Economic method of sensor installation in open tanks and vessels
- Rugged protective cage protects the sensor against abrasive solids in the process medium

Table 1

ppm Dissolved Oxygen at Saturation

<u>°C</u>	<u>Sea Water</u>	<u>Fresh Water</u>
0	11.97	14.62
2	11.36	13.84
4	10.82	13.13
6	10.29	12.48
8	9.84	11.87
10	9.43	11.33
12	9.05	10.83
14	8.69	10.37
16	8.37	9.95
18	8.06	9.54
20	7.77	9.17
22	7.48	8.83
24	7.21	8.53
26	6.93	8.22
28	6.67	7.92
30	6.41	7.63

Ref: RA ADS 2800-07