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WATER QUALITY CONTROL

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Quality System

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Corrosion Indices

The corrosiveness of water can be estimated by the calculation of one or more corrosion indices. A corrosion index is a mathematical formulation that is based on the concentrations of various chemical constituents and the physical properties of the water. Of the corrosion indices commonly in use, some are based on thermodynamic relations, whereas others are empirical formulations derived from experimental work.

Aggressive Index

The Aggressive Index (AI) essentially is a simplified version of the LSI, and is given by:

$$AI = pH + log[AH]$$

Where
A: Alkalinity (as mg/l $CaCO_3$)
H: Calcium Hardness (as mg/l $CaCO_3$)

AI ≥ 12.0	nonaggressive (noncorrosive) water.
12.0 > AI > 10.0	moderately aggressive water
10.0 ≥ AI	highly aggressive water.

Larson Index

The Larson Index (LI) is an empirically derived ratio of specific ions which expresses the corrosive nature of a particular water sample with regard to the rate of metal corrosion. The LI is given by the equation:

$$LI = \frac{Cl^- + SO_4^{2-}}{Alk}$$

where
Cl^-: Chloride ; SO_4^{2-}: Sulphate ; Alk: Total Alkalinity   (all as mg/l $CaCO_3$)

LI > 0.5: indicates potential water corrosiveness
The LI may be applicable to waters containing dissolved solids ranging from 250 to 1,000 mg/L

Riddick Corrosion Index

The Riddick Corrosion Index (RCI) takes into account a larger number of factors that influence corrosion than do the previously described indices. RCI is given by the equation:

$$RI = \frac{75}{Alk}[CO_2 + \frac{1}{2}(TH - Alk) + Cl^- + 2N\left(\frac{10}{SiO_3}\right)\left(\frac{DO + 2}{DO_{sat}}\right)]$$

where:
Alk = Alkalinity (as mg/l $CaCO_3$)
TH = Total Hardness (as mg/l CaCO3)
N = Nitrogen (mg/l N)
CO2 = Free carbon dioxide (mg/l)

Cl^- = Chloride (mg/l)
SiO_2 = Silica (mg/l)
DO = Dissolved oxygen (mg/l)
DO_{sat} = DO at saturation (mg/l)

RI < 25 non-corrosive
25 < RI < 50 moderately corrosive
50 < RI < 75 corrosive
RI > 75 very corrosive

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