

ICON PROGRAM

CONDUCTIVITY CALCULATIONS

CALCULATION MODE

ICON is a menu driven user-friendly program for calculating:

- Conductivity and pH @ 25 ° C from input concentrations of selected ions.
- Strong ions and weakly dissociated species are included in an ion-conductivity balance

INTERNAL DATABASE

ICON has an internal database of Limiting Equivalent Conductances and Equivalent Weights for the significant strong cations and anions, and for weakly ionized substances such as boron, chromium and carbon dioxide.

UNITS OF CONCENTRATION OPTIONS

Units of concentration are selected by the user from a menu of:

- ppb, ppm, $\mu\text{eq/l}$ or meq/l.

CALCULATING CONDUCTIVITY AND pH FROM CONCENTRATION INPUTS

Users select the units for input concentrations and supply the concentration values for each selected ion. Calculations automatically include H^+ and OH^- concentrations consistent with the solution electro-neutrality and dissociation constant for water at 25 ° C.

In the special case of CO_3^{2-} and HCO_3^- , only one concentration (HCO_3^-) is specified since the other is solved for automatically by the equilibrium relationship between these two ions and the H^+ ion. Species such as boron and chromium are entered as the elemental concentration, and the ionic concentrations of borate, chromate and bichromate are automatically determined by the calculation.

Equivalent weight for natural lithium is used for conductivity calculations. There is <1% difference in the weights of natural lithium and Li-7.

The Program assumes that all soluble iron is Fe^{+2} . This is a reasonable assumption for $\text{pH} < 8.5$ since at equilibrium, soluble Fe^{+2} is >90%. However, user should take into account that for $\text{pH} > 9.5$ calculated results will not be representative of actual conductivity since the molar ratio of total Fe to Fe^{+2} is 2, i.e. half Fe^{+2} and half $\text{Fe}(\text{OH})^+$.

SYSTEM TEMPLATES

Templates for calculating conductivity of the following systems are included in the ICON program.

- Reactor Water
- Condensate
- Make-up Water
- Fuel Pool
- Radwaste
- Others – for miscellaneous user systems

Calculated results are displayed on corresponding system tabs.

PRODUCING HARD COPY RECORDS

Calculated results are shown in the corresponding system worksheet and logged in ICON Data Log Worksheet in the Program. The Data Log Worksheet may be exported to another workbook with a command button. Calculation results may be printed via the Print Menu (Microsoft® Windows based command).

HARDWARE COMPATIBILITY AND REQUIREMENTS

IBM PC and Compatibles, Microsoft® Windows 98, NT, 2000, XP
Memory Required: Minimum of 640MB RAM