# Calculations for Ion-Selective Measurements

## 1. Calculation of the Interference Error

The Interference Error is calculated from the:

The Ion Concentration of the Ion to be Measured,

The Ion Concentration of the Interfering Ion,

The Selectivity Coefficient of the Interference.

It will be best demonstrated by an Example:

Interference Error for the Interference of Potassium on an Ammonium Measurement:

Potassium Concentration in the sample: 50 ppm.

Selectivity Coefficient for Potassium on the Ammonium Electrode: 0.11

a) Measuring 20 ppm Ammonium:
   Error = 50 x 0.11 / 20 = 0.275 = 27.5 %

b) Measuring 100 ppm Ammonium:
   Error = 50 x 0.11 / 100 = 0,055 = 5.5 %

Fortunately many Selectivity Coefficients are much lower!
But some of them can be much higher, then the interfering Ion must be absent (Concentration less than 10 exp -4 ppm).

## 2. Compensation of the Interference

**2.1)**
If the Concentration of the Interfering Ion in the sample is known and is constant, then one can do a Calibration with the Interfering Ion present in the Calibrating Solution.

**2.2)**
Other Methods are the so called “Incremental Methods”:

a) Standard Addition Method, where a known volume of a Calibration Standard is added to a known volume of Sample and the electrode signal before and after the addition is measured.

b) Sample Addition Method, where a known volume of Sample is added to a known volume of a Calibration Standard and the electrode signal before and after the addition is measured.

**2.3)**
Making a Multi-Parameter Calibration and Measuring the Concentration of the Interfering Ion. Then using a Computer Algorithm to Calculate the Ion Concentration of the Ion to be measured, from both Electrode signals and the Multi-Parameter Calibration.