

Pi^π Technical Note 168

AlkaSense[®]: Selecting the K-Factor and Titrant Acid Normality

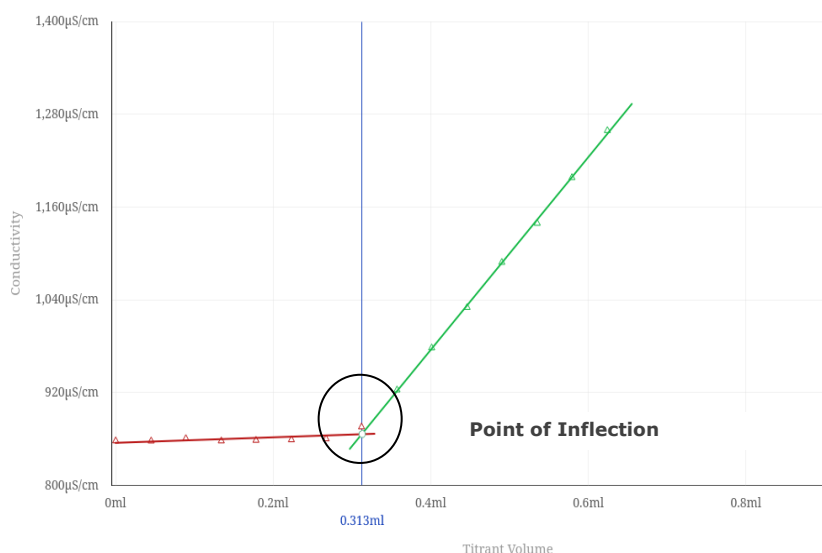
Background

Alkalinity is the capacity of water to resist acidification. So, the more alkalinity in a body of water, the more it is buffered against the reduction of pH through the addition of acid.

The Chemistry Behind AlkaSense[®]

The AlkaSense[®] from Pi works by titrating a water sample with an acid. It finds the endpoint (and therefore the total alkalinity) by monitoring the conductivity of a sample as aliquots of acid are added. The point of inflection in the resulting graph indicates when all the alkalinity has been consumed. From this, the analyser works backwards to determine the alkalinity of the sample.

Simply put, the AlkaSense[®] is not measuring one specific pH value like other alkalinity sensors on the market. Instead, it looks for a change in the rate of change of conductivity in the sample. The advantages of this technique are that conductivity sensors last a very long time, are very reliable, fast responding, and because we are looking for an inflection point as opposed to a set value, they need no calibration when used in an AlkaSense[®].



Behind Selecting the K-Factor to the Titrant Acid Normality

The AlkaSense[®] uses Pi's conductivity probe, ConductiSense. In order to properly specify the AlkaSense[®] to each individual application, it is necessary to specify two variables. The first is the 'K' factor (essentially the gain of the conductivity sensor chosen to match the conductivity of the sample) and the second is the strength of acid which is chosen to match the alkalinity of the sample.

To determine the K-factor and acid normality, start on the right hand side of the table and work towards the left side. Select the alkalinity range first, and then the conductivity value. This will then lead to the correct K-factor.

K - Factor	Acid (N)	Conductivity (µS)	Alkalinity (mg/l)
K = 1.0	0.06	10 - 2,000	5 - 100
	0.10	10 - 2,000	7.5 - 180
	1.00	100 - 2,000	50 - 1,000
K = 10	1.00	1,000 - 20,000	75 - 1,750

Conclusion

By determining alkalinity through conductivity based titration rather than pH measurement, the AlkaSense[®] provides a measurement approach that is inherently stable and low maintenance, making it well suited to continuous and long term operation. Correct selection of the conductivity K-factor and acid strength ensures accurate alkalinity determination and consistent analytical performance.