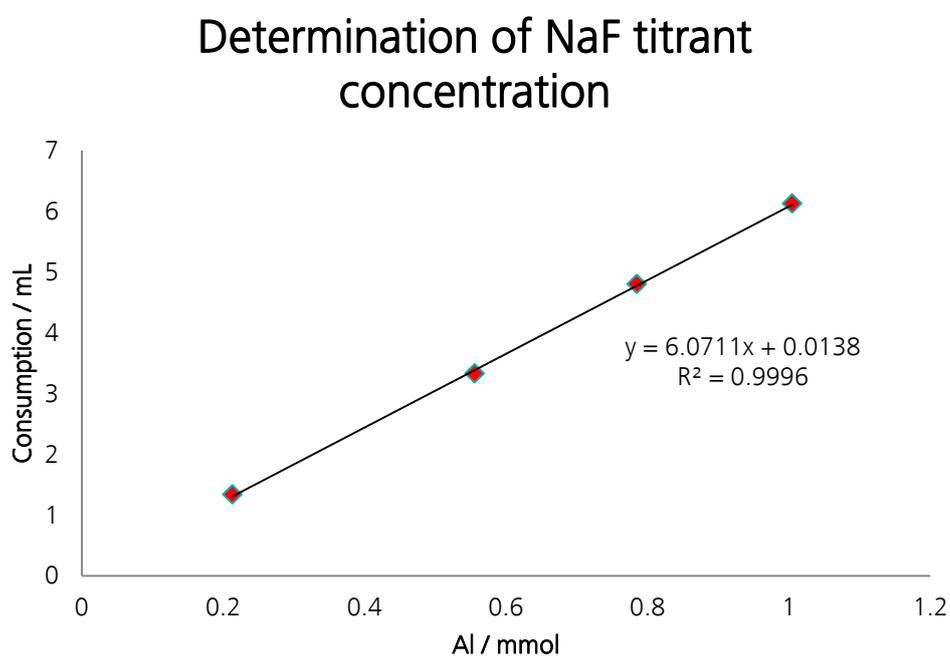


Determination of titer and method blank for thermometric titrations using *tiamo*TM



This Application Note describes in detail how to determine the blank and titer values for thermometric titrations using *tiamo*TM.

Method description

Summary

Both the titer and the method blank are calculated by linear regressions of the consumed volume of titrant against the amount of substance. The titer is calculated from the slope, while the method blank corresponds to the y-intercept of the linear regression.

In order to obtain a valid result, at least four determinations with **different sample sizes** need to be done. Also keep in mind that a method blank depends on the sample matrix and therefore is ideally determined on representative samples of similar substances or the sample itself.

*tiamo*TM can automatically calculate slope and intercept of a linear regression by plotting a defined variable against the method variable sample size. The sample size must therefore contain the amount of sample or standard in mmol, mg, or mL.

Method blank

Consumption = <command name>.EP(1).VOL

The volume found at the first (or only) endpoint is assigned to the first result variable RS01. This is done in order to calculate intercept ("method blank") and correlation coefficient.

Therefore, the statistics for this variable must be activated by checking the statistic box in the CALC command and Main Track.

Method blank = Intercept = RS.Consumption.ITC

For the first sample titrated in the series, no intercept of the linear regression will be obtained. **One must not** check the statistics box for this variable.

Correlation = (RS.Consumption.COR)^2

For the first sample titrated in the series, no correlation factor of the linear regression will be obtained. **One must not** check the statistics box for this variable.

Correlation is used to validate the parameters of the titration.

Titer

Consumption = <command name>.EP(1).VOL

The volume found at the first endpoint is assigned to the first result variable RS01. This is done to calculate the slope. The molarity and titer are calculated from the slope of the regression curve.

Therefore, the statistics for this variable must be activated by checking the statistic box in the CALC command and Main Track.

Slope = RS.Consumption.SLO

For the first sample titrated in the series, no slope of the linear regression will be obtained. **One must not** check the statistics box for this variable.

The calculation of the molarity depends on the chosen unit for the sample size. **One must not** check the statistics box for this variable.

If the sample size is given in mmol:

$$\text{Molarity} = \frac{\text{Stoichiometric factor}}{\text{Slope}}$$

If the sample size is given in mL:

$$\text{Molarity} = \frac{\text{Stoichiometric factor} \times \text{<standard>.CONC}}{\text{Slope}}$$

If the sample size is given in mg:

$$\text{Molarity} = \frac{\text{Stoichiometric factor}}{\text{Slope} \times M_s}$$

Where M_s = Molecular mass of the standard in g/mol:

$$\text{Titer} = \frac{\text{Molarity}}{\text{<command.name>.CONC}}$$

The titer is obtained by dividing the measured concentration through the nominal concentration. **One must not** check the statistics box for this variable.

Example

The amount of aluminum is determined by titration with fluoride with a nominal concentration of 1 mol/L. The chemical reaction is given below:



The obtained slope from the titer determination is 6.0711 mL/mmol

The measured concentration is therefore:

$$\text{Molarity} = \frac{6}{6.0711 \text{ mL/mmol}} = 0.9883 \text{ mol/L}$$

and the titer is:

$$\text{Titer} = \frac{0.9883 \text{ mol/L}}{1 \text{ mol/L}} = 0.9883$$