

Inorganic and Solution Chemistry-SH

Karl Fischer Titrator

Owner: [Mengjun Guo](#)

Principle :	Karl Fischer titration is a widely used analytical method for quantifying water content in a variety of products. The fundamental principle behind it is based on the Bunsen Reaction between iodine and sulfur dioxide in an aqueous medium. Karl Fischer Reaction: $\text{ROH} + \text{SO}_2 + \text{R}'\text{N} \rightarrow [\text{R}'\text{NH}]\text{SO}_3\text{R} + \text{H}_2\text{O} + \text{I}_2 + 2\text{R}'\text{N} \rightarrow 2[\text{R}'\text{NH}]\text{I} + [\text{R}'\text{NH}]\text{SO}_4\text{R}$ The alcohol reacts with sulfur dioxide (SO₂) and a base to form an intermediate alkylsulfite salt, which is then oxidized by iodine to an alkylsulfate salt. This oxidation reaction consumes water. Water and iodine are consumed in a 1:1 ratio in the above reaction. Once all of the water present is consumed, the presence of excess iodine is detected voltametrically by the titrator's indicator electrode. The amount of water present in the sample is calculated based on the amount of iodine consumed in the titration.	
Capabilities:	1) Coulometric KFT in coulometric Karl Fischer: iodine is generated in situ during the titration. Water is quantified on the basis of the total charge passed (Q), as measured by current and time. Coulometry is best suited for determination of water content in the range of 10 ppm to 5%. 2) Oven combined with Coulometric KFT: the sample is heated in an oven to free water contained to be titrated by coulometric KFT. The oven method is best suited for solids or incompatible samples and also for polymers in the range of 200 ppm to many percents.	
Asset:		Mettler C30SD ISO15512 Automate multiple sample operations Good selectivity for water High accuracy and precision Wide measurement range (ppm – 100%) No decomposition

Thermal Balance

Owner: [Mengjun Guo](#)

Principle :	By heating the sample on the balance until constant weight. Determination of the moisture content with the loss on drying method and consists of a weighing and halogen-heating unit.
Capabilities:	>100ppm

Asset:		Mettler HG63 Simple operation Short measurement time (5 – 15 minutes)
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Density Tester

Owner: [Mengjun Guo](#)

Principle :	The analytical balance can operate by immersion method and calculate the density of the sample automatically using a software integrated into the analytical balance.	
Capabilities:		
Asset:		Mettler Toledo Balance ASTM D792 Specimens may be in any void-free form except for powder and should have a mass of at least 1g. (The color chips and impact bars can be used to test the density.)

Muffle Furnace (Ash content)

Owner: [Mengjun Guo](#)

Principle :	Test the residual ash content of the sample which is calcined at high temperature. The organic part of the sample is oxidatively decomposed after burning at high temperature, and evaporates as a gas. The residual part is called ash.
Capabilities:	Component analysis (get the content of inorganic filler)

Asset:		Yamato FP310 ISO 3451 Temperature range: RT-1000°C Molding parts/pellets (2g)
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Capillary Viscometers (IV)

Owner: [Tingting Zhang](#)

Principle :	The differential viscometer has two capillaries connected in series with a sample loading/injection valve before the second capillary. Two differential pressure transducers, P1 and P2, are connected in parallel across the capillaries. A pump continuously supplies solvent flow. The ratio of the pressures P2 and P1 is proportional to the ratio of the viscosities of the fluid in capillary 2 to that in capillary 1.	
Capabilities:	IV is a measure of molecular weight for Nylon based materials that can be used to evaluate molding conditions and to define processing windows.	
Asset:		DSV Y501D ASTM D5225 Molding parts/pellets

Navigation: [SH PCL Main Page](#)|[Inorganic and Solution Chemistry](#)|[Mechanical and Chemical Res](#)|[Morphology](#)|[Physical](#)|[Rheology](#)|[Spectroscopy](#)