

Application Note AN-T-136

Epoxide equivalents in epoxy resin

Reliable determination according to EN ISO 3001 and ASTM D1652 by potentiometric titration

The epoxy content of epoxy resins has a strong influence on the reactivity of the resins as well as on the properties of the coating obtained from the resin curing process. The epoxy content is thus an important quality control parameter for manufacturers as well as consumers.

The analysis of the epoxy content is based on the reaction of hydrogen bromide with the epoxy groups of the sample. Hydrogen bromide in turn is produced by the reaction of tetraethylammonium bromide (TEABr) with standardized perchloric acid.

The standards EN ISO 3001 and ASTM D1652 describe the determination of the epoxy content expressed as epoxy equivalent weight (EEW) by titration. The use of a Titrando and Solvotrode easyClean instead of manual titration greatly increases the reproducibility and repeatability of the determination.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on the epoxide-containing portion of a two-component adhesive. No sample preparation is required.

EXPERIMENTAL

This non-aqueous titration is performed on a 905 Titrando system equipped with a magnetic stirrer and a Solvotrode easyClean for indication.

The sample is weighed into a titration beaker, and then dissolved in either chloroform or methylene chloride. Afterwards, TEABr reaction solution and glacial acetic acid are added, and the sample is titrated with standardized perchloric acid until after the equivalence point is reached.



Figure 1. 905 Titrando equipped with a Solvotrode easyClean for the analysis the epoxide equivalents controlled by a 900 Touch Control.

RESULTS

The analysis demonstrates acceptable and reproducible results and well-defined titration curves. For the tested two-component adhesive an epoxy equivalent weight (EEW) of 186.35 (n = 3, SD(rel) = 0.98%) is determined. An example titration curve is displayed in Figure 2.

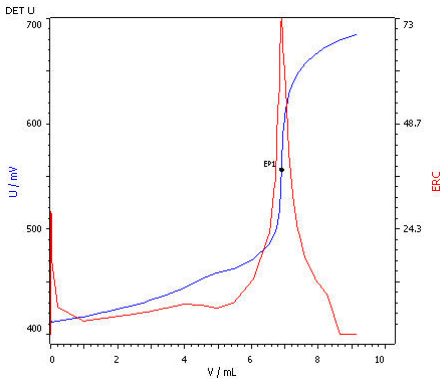


Figure 2. Titration curve for the EEW determination of the epoxide-containing component of two-component adhesive.

CONCLUSION

The determination of the epoxide equivalent weight (EEW) in epoxy resins can be performed easily using a 905 Titrando. The use of the Solvotrode easyClean, which is suitable for non-aqueous titrations, ensures reliable determinations of the equivalence point. A flexible sleeve diaphragm facilitates its cleaning. Using the correct electrode greatly increases the precision and reliability of the results. Thus, the reliable determination of the epoxy content in epoxy resins according to EN ISO 3001 and ASTM D1652 becomes possible in a simple manner.

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CONFIGURATION



OMNIS Titrator Oil

The OMNIS Titrator Oil offers you the complete package for all conventional analyses of petrochemical products. The package contains the OMNIS Advanced Titrator with magnetic and rod stirrer, a 20 mL cylinder unit, a d-Solvotrode for nonaqueous acid-base titration and one stand-alone OMNIS Software license.