

Determination of acetone-soluble matter in pulp

UniversalExtractor E-800: Extraction of acetone-soluble matter in pulp

A simple and reliable procedure for the determination of acetone-soluble matter in pulp is introduced. Pulp is the major raw materials to produce paper products and consists of lignocellulosic or man-made fibrous material from wood, fiber crops, waste paper, or rags [1,2]. The extractives, low or medium molecular weight components outside the cell wall, influence the physical properties of the material and are soluble in specific solvents such as acetone [3]. The acetone-soluble matter includes fatty acids, resin, fatty alcohols, sterols, di- and triglycerides, steryl esters and waxes [4]. In the presented application, the sample is extracted with the UniversalExtractor E-800 using the Soxhlet method. The total acetone-soluble matter content is determined gravimetrically. The procedure complies with the official method of ISO 14453:2014.

1. Introduction

The pulp and paper industry, with an approximate production volume of 416 million metric tons in 2019 [5], is one of the largest industries worldwide. The amount of acetone-soluble matter in pulp provides a measure of the content of wood extractives, including fatty acids, resin, fatty alcohols, sterols, di- and triglycerides, steryl esters and waxes. In the presented application, the sample is extracted with the UniversalExtractor E-800 using the Soxhlet method. The total acetone-soluble matter content is determined gravimetrically.

2. Experimental

Equipment: UniversalExtractor E-800

Pulp sheet, expected content: 0.1%

Extraction: 15 g sample was weighed into a glass sample tube with frit. The sample was extracted using the UniversalExtractor E-800 SOX, applying the parameters specified in Table 1. The sample was extracted in duplicates.

Table 1: Parameters for Soxhlet extraction with the UniversalExtractor E-800

Extraction method	Soxhlet
Solvent	Acetone
Extraction	4 hours
Heating level	11
Rinse step	5 min
Heating level	11
Drying 1	<input checked="" type="checkbox"/> AP 0 min
Heating level, time	9
Drying 1	<input type="checkbox"/> AP 2 min
Heating level, time	9
Drying 1	<input type="checkbox"/> AP 3 min
Heating level, time	0
Solvent volume	150 mL

The dry matter content was also determined and taken into account for the calculation of the acetone-soluble matter.

3. Results

The determined acetone-soluble matter content is presented in Table 2. The results correspond well with the expected value of 0.1%, with low relative standard deviations (rsd).

Table 2: Determined acetone soluble content of pulp (rsd: relative standard deviation), n=2

Sample	Acetone-soluble matter	Mean value	rsd
Pulp	0.12% 0.12%	0.12%	2.00%



Figure 1: Pulp

4. Conclusion

The determination of acetone-soluble content in pulp samples by use of the UniversalExtractor E-800 provides reliable and reproducible results. The results correspond well with the expected values with low relative standard deviations (rsd).

5. References

- [1] <https://www.pulpandpaper-technology.com/articles/pulp-and-paper-manufacturing-process-in-the-paper-industry>, 27.08.2021.
- [2] Bajpai, P. Biermann's Handbook of Pulp and Paper: Raw Material and Pulp Making. Elsevier, 2018.
- [3] Colodette J. L., A comparison of methods for eucalypt wood removal extractives, 5th International Colloquium on Eucalyptus Pulp, 2011.
- [4] ISO 14453: Pulps - Determination of acetone-soluble matter, 2014.
- [5] <https://pgpaper.com/wp-content/uploads/2018/07/Final-The-Global-Paper-Industry-Today-2018.pdf>, 27.08.2021.

For more detailed safety considerations please refer to the corresponding MSDS.