

Organic Solvents Extraction and Extract Content measurement

Extractives are a variety of wood components. Although usually representing a minor fraction, the extractives are soluble in water or neutral organic solvents: hexane, benzene, ether, acetone, and alcohol. The content of extractives is usually less than 5%, but it can be up to 40% of the dry wood weight. Although there are similarities in the occurrence of wood extractives within families, there are distinct differences in the composition even between closely related wood species. As a rule, various parts of the same tree, that is, stems, branches, roots, barks, and needles, differ markedly with respect to both their amounts and composition of extractives.

In this lab class, you will extract extractives using organic solvents and produce fat-removed samples. In extraction part, alben (ethanol : benzene = 1 : 2 v/v) should be used for extraction. The extractives may include resins, fats, chlorophylls, waxes, essential oil, or other minor components. The sample without extractives is called fat-removed sample, and fat-removed sample is used for quantitative analysis of lignin and holocellulose.

1. Materials

- ① Biomass: **Mongolian Oak** (1 group), **Larch** (2 group), **Rapeseed stalk** (3 group) → (40 mesh)
- ② Equipment: Water bath & Soxhlet, Oven (105°C), Desiccator

2. Methods

- ① Preheat a water bath to 80°C.
- ② After drying a round bottom flask in oven (105°C, 24 h), cool it down in desiccator and weigh a ODW (oven dry weight) the flask.
- ③ Insert a sample 2 g in thimble and cover the mouth of the thimble with Kimwipe.
- ④ Solvent: put the alben (bp: 78.4°C, 80.1°C) 150 ml in round bottom flask and set up a soxhlet.
- ⑤ Extract during 6 hours.
- ⑥ After decompressing extraction and drying the flask (flask+extractives) in oven (105°C, 24 h), cool it down in desiccator and weigh a ODW (oven dry weight) the flask.
- ⑦ Calculate the amount of extractives in the sample, on a percent dry weight basis.

$$\text{Extractives (\%)} = \frac{\text{ODW flask + extractives (g)} - \text{ODW flask (g)}}{\text{ODW (oven dry weight) sample (g)}} \times 100$$

3. Report – 1st Week (Reference must be mentioned)

- ① Research wood extractives simply.
 - ② Research methods of extraction and condensation of extractives.
 - ③ Research methods of measurement of Holocellulose and Lignin contents.
 - ④ Describe creative ideas for analyzing the components more easily and economically.
- ※ **Report should be written by MS words (10 points, line spacing 1) or Hancm office (10 points, line spacing 120).**
- ※ **Writing procedure of report (in Korean): 1. Introduction, 2. Materials and methods, 3. Results and discussion, 4. Conclusions, 5. References**

- ※ You should report 1st week data and 2nd week data together, share data with other groups and compare components of samples respectively.
- ※ Assignment should be appended to report. (If you copy and paste, you can not get a grade)
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