

超声水处理过程中木材内部抽提物迁移规律探究

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摘 要:【目的】观察未处理臭椿材中抽提物的分布, 探究超声水处理对臭椿材苯醇抽提物和热水抽提物含量的影响, 并分析超声水处理过程中臭椿材内部抽提物在超声传播方向上的迁移。【方法】通过体式显微镜、光学显微镜、扫描电镜观察未处理臭椿材抽提物的分布; 以时间为变量(间隔 30min)对臭椿材进行超声水处理(320 W, 25 kHz), 并进行热水和苯醇抽提实验, 探究超声水处理对热水抽提物和苯醇抽提物含量的影响; 在比色皿路径为 1 cm, 波长为 350 nm 条件下, 用紫外/可见分光光度计对臭椿材抽提物的吸光度进行测定; 采用重量法和吸光度法联合阐明超声水处理过程对臭椿材抽提物迁移规律, 具体对臭椿木块分层抽提物浓度值和各层之间的排序大小变化进行探究。【结果】抽提物含量丰富, 主要分布在早晚材导管中, 且会堵塞导管纹孔; 臭椿热水抽提物含量高于苯醇抽提物含量, 抽提物含量随着超声时间(0~5 h)的延长逐渐降低, 超声水处理 2 h 内的抽提物含量下降趋势较快; 抽提物浓度和吸光度值成正比, 关系公式为: $A=0.79829C$, R^2 为 0.99755; 超声水处理臭椿材剩余平均抽提物浓度呈现随着超声时间的延长先增加(0~90 min)后降低(90~180 min)后隔 30 min 上下波动的趋势。【结论】初步得出了超声对木材内部抽提物迁移模型, 即超声处理材的抽提物变化是“可抽提区域抽提物”增多、木材内移动和移出木材的动态过程的复合。

关键词: 臭椿; 超声; 抽提物; 迁移模型

Study on the Migration Law of Extracts in Wood during Ultrasonic Water Treatment

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Abstract: 【Objective】 This study aimed to observe the distribution of extracts, investigate the impact of ultrasonic water treatment on the contents of benzene alcohol extracts and hot water extracts, and analyze the migration of extracts in the direction of ultrasonic propagation during ultrasonic water treatment for *Ailanthus altissima* wood. 【Method】 The distribution of extracts in untreated samples was observed using stereo microscopy, optical microscopy, and scanning electron microscopy. Samples was ultrasonically treated (320 W, 25 kHz) at 30-minute intervals. The contents of hot water extracts and benzene alcohol extracts were calculated to elucidate the effect of ultrasonic water treatment on the contents of hot water extracts and benzene alcohol extracts. The absorbance of the extracts was measured using a UV/Vis spectrophotometer at a wavelength of 350 nm with the

cuvette pathlength of 1 cm. The migration pattern of extracts during ultrasonic water treatment was studied by combining the weight method and the absorbance method. To be specific, the concentration values of extracts in different layers and the order of the layers were recorded. **【Result】** The extracts of *Ailanthus altissima* wood was rich, mainly distributed in the vessel of early wood and late wood, which could block the pits. Moreover, the contents of hot water extracts in *Ailanthus altissima* were higher than that of benzene alcohol extracts. The contents of extracts gradually decreased with the extension of ultrasonic time (0~5 h), a faster decline trend within the first two hours of ultrasonic treatment could be drawn. The concentration of extracts was proportional to the absorbance value, and the relationship formula was $A = 0.79829C$, with an R^2 value of 0.99755. The average residual concentration of extracts in *Ailanthus altissima* wood showed a trend of increasing (0~90 minutes), then decreasing (90~180 minutes), and fluctuating up and down every 30 minutes during ultrasonic water treatment. **【Conclusion】** This study obtained a preliminary model of the migration of extracts inside wood during ultrasonic treatment. The changes of extracts for ultrasonic-treated samples could be considered as a dynamic recombination process, including the increase of extracts in the extractable area, the movement of extracts inside wood, and the removal of extracts outside wood.

Keywords: *Ailanthus altissima*; ultrasound; extracts; migration model