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微波辅助提取苦参生物碱的比较研究

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中文摘要:目的：比较密闭微波辅助提取法（PMAE）、聚焦微波辅助提取法（FMAE）及微波辐射-溶剂回流提取法（PMIRE）三种微波辅助方法用于苦参生物碱的提取差异，探讨PMAE、FMAE、PMIRE的提取过程及其微波作用的机理。方法：以苦参碱与氧化苦参碱为目标物，采用HPLC法测定，通过优化微波功率、提取温度、提取时间、药材颗粒度、固液比等实验条件，以及计算其热力学函数来表征、用电子扫描电镜观察药材表面结构变化。结果：与常规的回流提取（SRE）法相比，PMAE、FMAE、PMIRE法的提取效率明显提高，其热力学函数 和 明显增大， 更小. 微波作用能使药材表面结构发生细胞破壁，强化提取过程。结论：微波辅助提取苦参生物碱提取效率均优于常规的溶剂回流提取方法；微波辅助方式、作用程度、提取过程不同，提取效率有较大差异；PMAE提取时间最短；PMIRE法由于微波直接作用强，细胞破壁效果更好，提取率最高，且仪器设备简单，操作简便。

中文关键词:微波辅助提取 比较研究 苦参 生物碱 HPLC

Comparative study on extraction of alkaloids from Sophora flavescens Ait. by microwave-assisted extraction methods

Abstract: To compare extraction efficiency of extracting alkaloids from Sophora flavescens Ait. using different microwave-assisted extraction(MAE) techniques such as pressurized microwave-assisted extraction(PMAE), focused microwave-assisted extraction(FMAE) and post-microwave-irradiated reflux extraction(PMIRE), and investigate the mechanisms of their processes under microwave-assisted extraction. Method: Selecting oxymatrine and matrine were as target alkaloids to be determined by HPLC, which experimental conditions of PMAE、FMAE and PMIRE were optimized respectively. The processes of extracting alkaloids was characterized through calculating thermodynamic functions and observing cell surface structure using scanning electron microscope(SEM). Result: The PMAE、FMAE and PMIRE are superior to the conventional solvent reflux extraction(SRE) as a result of microwave effects on the materials and solvent, and leading to great changes of cell surface structure of cells. and of alkaloids obviously increased, thier became smaller. Conclusion: The action of microwave could intensify the extraction process, improving higher yields of alkaloids. The yields depended on mode, action degree of microwave and extraction procedures using MAE. As PMAE had shortest extraction time, PMIRE for the yield of alkaloids was greatest in above methods of microwave-assisted extraction due to higher level of cell-rupture. Its equipment is simple, and easy-operating.

keywords: Microwave-assisted extraction Comparative study Sophora flavescens Ait. Alkaloids HPLC

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