

樟树精油提取剩余物吸附性能研究

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摘要:【目的】本文采用磷酸-氢氧化钾二次活化法将樟树叶精油提取残渣进行活化,产生具有高附加值的多孔炭,有助于樟树资源化的深度利用。【方法】以精油提取后的樟树叶为原料,使用磷酸-氢氧化钾活化法得到多孔炭并研究其对亚甲基蓝的吸附性能。利用扫描电子显微镜、BET 比表面仪、傅里叶红外光谱仪对多孔炭的物理化学性质进行表征。考察了吸附剂用量、溶液 pH、吸附温度和吸附时间对活性炭吸附性能的影响。【结果】对多孔炭表征结果表明,二次活化法得到的多孔炭具有较大的比表面积 ($1450\text{m}^2/\text{g}$)、丰富的孔结构以及含氧官能团,有利于亚甲基蓝的吸附;吸附实验结果表明在温度 $60\text{ }^\circ\text{C}$ 和 $\text{pH} = 10.0$ 时吸附 240 min , 其对初始浓度为 50 mg/L 亚甲基蓝的最大吸附容量为 527 mg/g , 吸附过程符合 Langmuir 等温模型;此外,经过五次循环使用,吸附量有所减小,但去除率均达到了 90% 以上,多孔炭循环使用性能良好。【结论】采用磷酸-氢氧化钾二次活化法得到的樟树叶精油提取残渣多孔炭表现出良好的孔结构和吸附性能。

关键词: 多孔炭; 二次活化法; 吸附性能; 亚甲基蓝

Preparation of porous carbon from *Camphor* tree essential oil extraction residue and its adsorption performance research

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Abstract: 【Objective】The high added value porous carbon is produced from the residue of camphor tree essential oil extraction by the $\text{H}_3\text{PO}_4\text{-KOH}$ secondary activation method in this paper, which is helpful for the deep utilization of camphor tree resources. 【Method】Using the residue of camphor tree leaves essential oil extraction as raw materials, porous carbon was obtained by the $\text{H}_3\text{PO}_4\text{-KOH}$ secondary activation method and its adsorption performance for Methylene blue (MB) was studied. The physical and chemical properties of porous carbon was characterized through scanning electron microscopy, BET surface area analyzer, and Fourier transform infrared spectroscopy. The effects of adsorbent dosage, solution pH, adsorption temperature, and adsorption time on the adsorption performance of porous carbon were also investigated. 【Result】The characterization results of porous carbon indicate that the porous carbon obtained by secondary activation method has a large specific surface area ($1450\text{m}^2/\text{g}$), rich pore structure, and oxygen-containing functional groups, which are conducive to the adsorption of the MB. The adsorption experiment results showed that the maximum adsorption capacity of 527 mg/g for methylene blue was achieved at a temperature of 60°C and $\text{pH}=10.0$, with an initial concentration of 50 mg/L MB.

The adsorption process is in accord with the Langmuir isotherm model. In addition, the adsorption capacity has decreased after five cycles of use, but the removal rate has all reached over 90%, indicating good performance of porous carbon recycling. **【Conclusion】** The porous carbon obtained from the residue of camphor tree essential oil extraction using the H_3PO_4 -KOH secondary activation method exhibits good pore structure and adsorption performance.