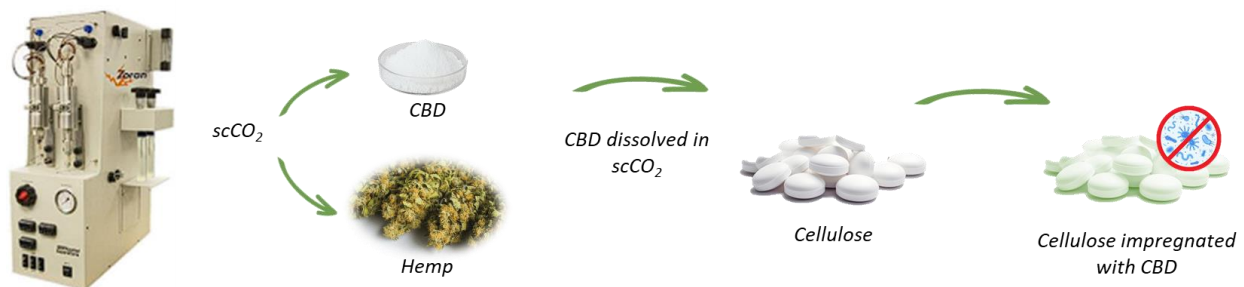


## Master's Thesis

# Application of Supercritical CO<sub>2</sub> Technology for Impregnating Cellulose-Based Materials with Hemp Extracts Derivatives

Bacterial resistance to conventional antibiotics is a growing global health concern that jeopardizes the effectiveness of treatments for severe infections. A promising alternative to this issue is using natural biological compounds, such as plant extracts. These extracts, rich in phenolic compounds, hold significant potential for developing new antimicrobial agents that are safer for human health and more environmentally friendly. Before final application, plant extracts need to be stabilized on porous carriers to ensure controlled release, prevent degradation, and maintain their bioactive properties.

This thesis will investigate environmentally friendly techniques based on supercritical CO<sub>2</sub> (SC-CO<sub>2</sub>) technology to obtain materials with antibacterial properties without applying organic solvents. The research will focus on applying SC-CO<sub>2</sub> impregnation and integrated SC-CO<sub>2</sub> extraction-impregnation techniques to impregnate porous cellulose materials with pure cannabidiol (CBD) and hemp flower extract, which is abundant in CBD. The operating conditions of the SC-CO<sub>2</sub> processes (pressure, temperature, contact time, and, optionally, the co-solvent concentration) will be tuned to optimize the impregnation and ensure the production of high-quality final products.



### Methods and devices:

- Supercritical fluid impregnation
- Integrated supercritical fluid extraction-impregnation
- ATR-FTIR Spectroscopy
- High performance liquid chromatography (HPLC)
- Gas chromatography (GC)

### Requirements:

The student should be highly motivated, organized, and able to work independently. Prior experience in SC-CO<sub>2</sub> technology, ATR-FTIR, HPLC, GC, is not required.

**Start:** Immediately

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