

MODIFICATION OF A COMMERCIAL SUPERCRITICAL FLUID EXTRACTION PILOT UNIT FOR ASSISTING CO₂ RECYCLING

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The present work describes the setting up of a modification of a commercial supercritical fluid extraction pilot unit for assisting CO₂ recycling based on supercritical adsorption on a biomaterial. In addition to its construction, a survey of cost was done to estimate the cost of this homemade accessory developed to allow the an effective CO₂ recycling units. The contracted accessory was validated using an oat bran was used as a model adsorption material and annatto seeds (*Bixa orellana* L.) as a model plant material. The fact of having installed an adsorption column as part of the initial CO₂ recycle system was to keep the CO₂ mass in conditions as if it were entering the system for the first time (i.e., 99.9% purity). In this sense, a 0.65 L adsorption column was installed next to a set of connections and valves that complement the unit recycle system. Thus, the incorporation of an adsorption column along with valves and accessories allowed preliminary tests to be carried out to validate the reincorporation of the CO₂ recirculation system at the unit. The tests consisted of defatting annatto seeds reaching mass ratio of solvent to the feed mass values 11, 25, 35 and 55 with a mass flow rate of 200 g/min in all cases. Achieving the reasonable use of economic resources while at the same time achieving a major savings when thinking only about the purchase of solvent. The cost survey showed that an estimated total amount of USD 5731.36 would cost to have the developed accessory in a SFE unit similar to that one that we have coupled on. Acknowledgements: Ricardo A. C. Torres thanks Capes for their doctorate assistantship. Diego T. Santos thanks CNPq (processes 401109/2017-8; 150745/2017-6) for the post-doctoral fellowship. M. Angela A. Meireles thanks CNPq for the productivity grant (302423/2015-0). The authors acknowledge the financial support from FAPESP (process 2015/13299-0).