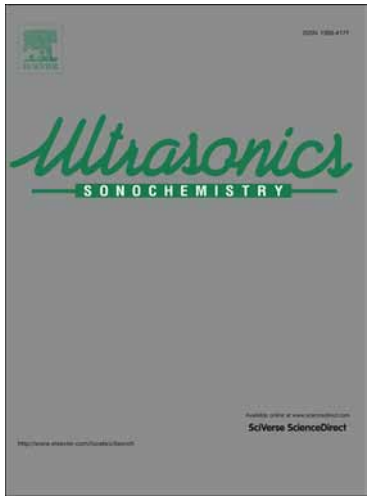
Accepted Manuscript



Extraction mechanism of ultrasound assisted extraction and its effect on higher yielding and purity of artemisinin crystals from *Artemesia annua* L. leaves

Smain Chemat, Abdallah Aissa, Abdenour Boumechhour, Omar Arous, Hamid Ait-Amar

PII: S1350-4177(16)30196-1
DOI: http://dx.doi.org/10.1016/j.ultsonch.2016.05.046
Reference: ULTSON 3256

To appear in: *Ultrasonics Sonochemistry*

Received Date: 1 February 2016
Revised Date: 16 April 2016
Accepted Date: 28 May 2016

Please cite this article as: S. Chemat, A. Aissa, A. Boumechhour, O. Arous, H. Ait-Amar, Extraction mechanism of ultrasound assisted extraction and its effect on higher yielding and purity of artemisinin crystals from *Artemesia annua* L. leaves, *Ultrasonics Sonochemistry* (2016), doi: http://dx.doi.org/10.1016/j.ultsonch.2016.05.046

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Extraction mechanism of ultrasound assisted extraction and its effect on higher yielding and purity of artemisinin crystals from *Artemesia annua* L. leaves

Smain CHEMAT [a*], Abdallah AISSA [a], Abdenour BOUMECHHOUR [a,b], Omar AROUS [b], Hamid AIT-AMAR [c]

[a*] *Extraction & Separation Techniques Team, Centre de Recherches Scientifique et Technique en Analyses Physico-Chimiques (C.R.A.P.C), BP 248 Alger RP 16004, Algiers, Algeria*

[b] *Faculté de Chimie, Université Houari Boumediene (USTHB), BP 32, El-Alia 16112 Bab-Ezzouar, Alger, Algeria*

[c] *Faculté de Génie des Procédés et de Génie Mécanique, Université Houari Boumediene (USTHB), BP 32, El-Alia 16112 Bab-Ezzouar, Alger, Algeria*

(*) Corresponding author (S. Chemat) Email: chemats@yahoo.fr

Abstract

This study proposes an ultrasound-horn system for the extraction of a natural active compound "artemisinin" from *Artemisisa annua* L. leaves as an alternative to hot maceration technique. Ultrasound leaching improves artemisinin recovery at all temperatures where only ten minutes is required to recover 70% (4.42 $mg.g^{-1}$) compared to 60 min of conventional hot leaching for the same yield. For instance, ultrasound treatment at 30°C produced a higher yield than the one obtained by conventional maceration at 40°C. Kinetic study suggests that the extraction pattern can be assimilated, during the first ten minutes, to a first order steady state, from which activation energy calculations revealed that each gram of artemisinin required 7.38 kJ in ultrasound versus 10.3 kJ in the conventional system. Modeling results indicate the presence of two extraction stages, a faster stage with a diffusion coefficient of 19 $x10^{-5}$ $cm^2.min^{-1}$ for ultrasound technique at 40°C, seven times higher than the conventional one; and a second deceleration stage similar for both techniques with diffusion coefficient ranging from 1.7 to 3.1 $x10^{-5}$ $cm^2.min^{-1}$. It is noted that the efficient ultrasound extraction potential implies extraction of higher amount of co-metabolites so low artemisinin crystal purity is engendered but a combination with a purification step using activated charcoal and celite adsorbents produced crystals with comparable purity for conventional and ultrasound samples.

Keywords: *Ultrasound ; Artemisinin ; extraction* ; *diffusion coefficient ; purification ; crystallisation*

Download English Version:

https://daneshyari.com/en/article/7703684

Download Persian Version:

https://daneshyari.com/article/7703684

Daneshyari.com