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A new approach to catalytic hydrolysis of ester-bound biphenyl cyclooctene lignans from the fruit of *Schisandra chinensis* Baill by ion exchange resin

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ABSTRACT

In this study, a novel approach was developed to hydrolyze ester-bound biphenyl cyclooctene lignans (EBBCL) from the fruits of *Schisandra chinensis* Baill into free-state biphenyl cyclooctene lignans (FSBCL) using ion exchange resin. The results of static hydrolysis tests showed that SK1B (H-type strongly acidic cation exchange resin) was the best acidic hydrolysis catalyst and 201×7 (OH-type strongly basic anion exchange resin) was the best basic hydrolysis catalyst. According to the underlying mechanism for hydrolytic degradation, the hydrolysis effect of basic catalyst is more obviously. The dynamic hydrolysis efficiency of 201×7 ($146.7 \pm 5.0\%$) was higher than that of SK1B ($131.5 \pm 4.7\%$). Compared with the purity of FSBCL ($3.52 \pm 0.06\%$) catalytic hydrolysis by traditional catalyst NaOH, the purity of FSBCL ($5.85 \pm 0.04\%$) hydrolysis by 201×7 resin was much higher, increased 2.94-fold under the optimization hydrolysis conditions.

Keywords: *Schisandra chinensis* Baill; Biphenyl cyclooctene lignans; Catalytic hydrolysis; Ion exchange resin

1. Introduction

Dried fruits of *Schisandra chinensis* Baill are one of the most famous and frequently used herbal medicines and food additives (Pharmacopoeia of the People's Republic of China, 2010). It has a long history of medical use as a tonic, sedative and astringent agent to treat various diseases in China, Korea and Japan (Park et al., 2009; Chang et al., 2005; Wang, 2002). Various reports suggested that major bioactive constituents of *S. chinensis* were free-state biphenyl cyclooctene lignans (FSBCL), including schizandrin [S], schisantherin A [SA], deoxyschizandrin [DS] and γ-schizandrin [GS] (Kuo et al., 1997; Chen et al., 1998; Choi et al., 2006; Panossian and Wikman, 2008; Ma et al., 2011a). The beneficial biological active effects of *S. chinensis* FSBCL are anti-hepatotoxic, antioxidant (Chiu et al., 2002; Ko and Lam Brian, 2002), antitumor (Deng et al., 2008; Chen et al., 2002), anti-HIV (Bharate Sandip, 2003; Chen et al., 1996), detoxificant, anticarc inogenic (Fu et al., 2008), activity on circulatory system (Opletal et al., 2001), central nervous system and counteract the fatigue, increase the durance (Peng et al., 2005), anti-inflammatory (Guo et al., 2008) and improve the physical fitness of sportsmen (Peng et al., 2005). It also has other pharmacological effects, such as chronic cough, asthma, spontaneous sweating, palpitation, spermatorrhea, diabetes, insomnia, forgetfulness (Wu, 2005) and antiproliferative effects on cancer cells (Min et al., 2008).

The hydroxyl group in the structure of biphenyl cyclooctene lignans can easily form ester bond with other organic acid in plants. Hydrolysis can increase the content of FSBCL by transformation of ester-bond biphenyl cyclooctene lignans (EBBCL). In the hydrolysis process, cleavage of the

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