Evaluation of commercial resins to recover phenolic compounds

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Abstract

In recent years, plant-based functional foods are gaining great attention due to their natural availability and therapeutic potential. Pharmaceutical, cosmetic and food industries show a growing interest in the bioactivity provided by these phytochemicals. Phenolic compounds are the most numerous and they are present in a large variety of wastewaters. However, its presence has a negative impact on the environment due to its phytotoxic and antibacterial profile, resistant to biological degradation. Wastewater from olive oil, table olive or pickles production, due to the large phenolic compounds content, can be a very important and profitable

source from both environmental and economic point of view of these natural antioxidants.

In this work four commercial resins (MN200, MN202, PAD900 and PAD950, provided by Purolite Ltd) were investigated for their potential use in the recovery of phenolic compounds from wastewaters. For this purpose, their adsorption capacity in a model solution that contained two different phenolic compounds (1.1 g L-1 of tyrosol and 2 g L-1 of catechin) was evaluated.

Table 1. Percentage of adsorption of phenolic compounds for all the resins tested at different concentrations

% Adsorption				
Dosage (g/L)	**MN200**	**MN202**	**PAD900**	**PAD950**
10	78.73 ± 1.43	59.88 ± 1.40	55.42 ± 0.42	51.66 ± 2.81
20	91.79 ± 0.94	70.28 ± 2.84	60.05 ± 0.54	59.23 ± 0.79
30	94.24 ± 0.48	80.08 ± 2.11	67.61 ± 1.03	59.83 ± 1.08
40	95.68 ± 0.59	91.43 ± 1.06	74.23 ± 2.57	63.84 ± 1.43
50	96.29 ± 0.14	91.81 ± 1.38	74.80 ± 0.46	63.57 ± 0.62
60	97.41 ± 0.07	93.07 ± 1.50	74.18 ± 1.42	64.71 ± 0.64

The percentage of phenolic compounds adsorption was higher (more than 90% in some cases) with the "MN" resins (Table 1). On the other hand, the adsorption did not show great variation from 40 to 60 gL-1 of resin dosage. Therefore, it was decided to select the concentration of 40 gL-1 as the optimal one for the recovery of phenolic compounds. Desorption was performed for this dosage with ethanol and ethanol/water solution (50% v/v). The desorption with the

ethanol/water solution presented higher efficiency in terms of phenolic compounds recovery for all the resins (Table 2).

Table 2. Desorption of phenolic compounds for the best dosage (40 g·L-1) with ethanol and ethanol/water 50% v/v solution

	% Desorption	
Resin	**Ethanol**	**Ethanol/Water**
MN200	86.04 ± 2.14	89.32 ± 1.7
MN202	88.28 ± 1.02	97.25 ± 0.41
PAD900	78.85 ± 3.67	94.18 ± 4.27
PAD950	93.18 ± 1.87	98.42 ± 2.09

Keywords: Polymeric resin, phenols recovery, adsorption, desorption.