

Simple approach for cleaning up 2,4,6-trichloroanisole from alcoholic-beverage-reconstituted solutions using polymeric materials

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Background and Aims: 2,4,6-Trichloroanisole (TCA) is a well-recognised contaminant in the wine and whisky industries. In this work, several polymeric materials were tested through a hybrid strategy (computational and experimental studies) as potential fining agents for elimination of TCA.

Methods and Results: Sodium alginate, polyaniline emeraldine base (PANI-EB), polyaniline emeraldine salt (PANI-ES) and three cross-linked derivatives of different generations (G3, G4 and G5) of polyamidoamine (PAMAM) were tested. Materials were characterised by Fourier transform infrared spectroscopy and thermogravimetric analysis. The amount of material and the interaction time needed to achieve TCA sorption were optimised in a screening study. The binding capacity of the materials was then determined in methanol-reconstituted wine and whisky solutions to demonstrate their effectiveness. The proportion of TCA in wine retained by PANI-ES, PANI-EB and PAMAM-G5-CD was greater than 75%, and for whisky all polymers except PANI-ES retained greater than 75% of TCA. The concentration of phenolic substances of both methanol-reconstituted solutions was measured after treatment; most of the polymers had no impact on the concentration of phenolic substances. The intermolecular interactions between the polymeric materials and TCA were characterised by computational studies involving molecular dynamics simulations.

Conclusions: The polymers PAMAM G5-CD and PANI-EB retained the most TCA in reconstituted red wine and whisky solutions. Significance of the Study: The provision of efficient materials for the removal of TCA will improve the purification processes employed in beverage production. © 2019 Australian Society of Viticulture and Oenology Inc.

polyamidoamine

polyaniline

sodium alginate

TCA

whisky

wine