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Removal of recontamination by cork taint from the surface of cork stoppers by atmospheric pressure plasma processes

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Recontamination of the surface of cork stoppers by cork taint just before bottling is still an unsolved challenge for both the manufacturers of bottling lines and the producers of wine and sparkling wine. After bottling, the cork taint on the surface of the cork stoppers can be easily released and - at a sufficiently high concentration - spoil the wine and sparkling wine, respectively, thus causing considerable economic losses and customer dissatisfaction.

Cork taint is mainly due to the musty taste of halogen anisoles, 2,4,6-trichloroanisole or TCA in particular, in a certain concentration in wine and sparkling wine. Two different atmospheric pressure microwave plasma sources have been applied for the tests to remove TCA from the surface of artificially contaminated natural cork stoppers: a micro plasma jet and a plasma torch. While the plasma of the micro plasma jet was directly applied onto the surface of the cork stoppers, the cork stoppers could only be exposed to the remote plasma of the plasma torch in order to avoid any damage due to thermal effects. Several process parameters - e.g., the microwave power, different working gases and mixtures thereof, the plasma exposure time, and the distance between the plasma source and the cork stoppers - have been optimised for improving the efficiency of the plasma processes with regard to the removal of TCA from the surface of the cork stoppers. The corresponding results of the releasable TCA on the surface of the cork stoppers before and after plasma treatment will be presented and correlated with the characterisation of the plasmas of the two atmospheric pressure plasma sources by optical emission spectroscopy.

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Keywords

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plasma torch
atmospheric pressure plasma
surface cleaning
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