

# Domhayn<sup>®</sup>

## Hydrostatic diffusion, mass spectrometry insight

Research extract from a preliminary trial of three vodka samples

Completed with chromatography coupled to mass spectrometry, using a Thermo Fisher Scientific hybrid quadrupole-Orbitrap mass spectrometer by Department of Chemistry, University of Oxford



### Glass bottle

Baseline market vodka



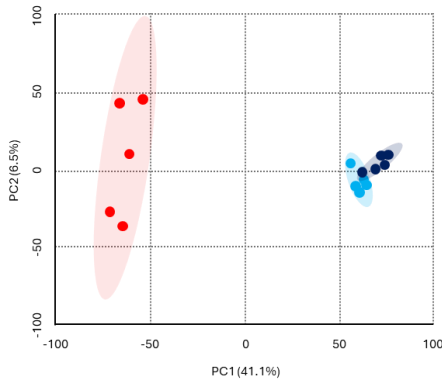
### Ex-sherry cask

Vodka-filled **control** cask  
Not submerged



### Ex-sherry cask

Vodka-filled **subject** cask  
Submerged to 215 meters

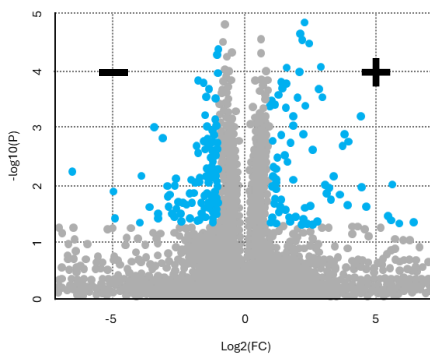


### Principal Component Analysis

Simplified presentation of the >11,000 data points, focusing on components with the greatest variance across all three samples.

Transition from the red to light blue clusters represents the general effect of casking this spirit (i.e. traditional time-dependent maturation).

The tangent between light blue dots (control cask) and dark blue dots (subject cask) then reflects the novel compositional evolution achieved by hydrostatic diffusion during cask submersion.



### Compound comparison volcano plot

Visual representation of the 218 significant\* compound increases and decreases of the control sample, compared to the newly evolved compound composition of the subject sample.

Less statistically significant differences between the two samples are represented by grey dots, demonstrating the extent of preservation of the original spirit's character even after submersion.

\*statistically reliable changes in abundance (i.e. double or more)

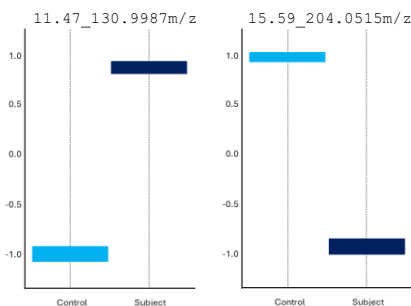


Fig 1.

Fig 2.

### Compound concentration box plots

Just two examples of thousands of those increasing and decreasing compositional transformations between the control and subject samples.

Fig 1. shows how submersion generated an increased prevalence of grape-based Tartaric Acid, from this particular casks ex-sherry fill, evidence of the additional extractive function of submersion.

Fig 2. demonstrates how this submersion experiment decreased the prevalence of sulphur-containing bioactive molecules (such as lipoamide or sulforaphane) contributing to a cleaner, smoother profile.