

Factors which can effect flavour and aroma damage in bottle.

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Background

- The business
- Services provided
- Identifying opportunities to help industry
- Increasing number of issues in wines and spirits
- Not classic faults – just different products, less attractive

Clues

- Products on open shelves
- Products in a warm environment
- Products shipped (especially across the equator)
- Wines and delicate white spirits (gin!!)
- Products in white flint glass
- Could we confirm these changes analytically AND can we develop forcing methods to identify susceptible products/packaging?

Key factors re damage/premature ageing

- Excessive heat
- Excessively low temperatures
- More importantly temperature fluctuations
- Movement/shaking – road miles
- Bottle size
- Fill height/ullage
- Dissolved oxygen content
- Closure
- And...

Most importantly for white spirits (and wines)

- Type of glass
- Brown 😊
- Green
- White flint 😞
- Miniature white flint are the worst

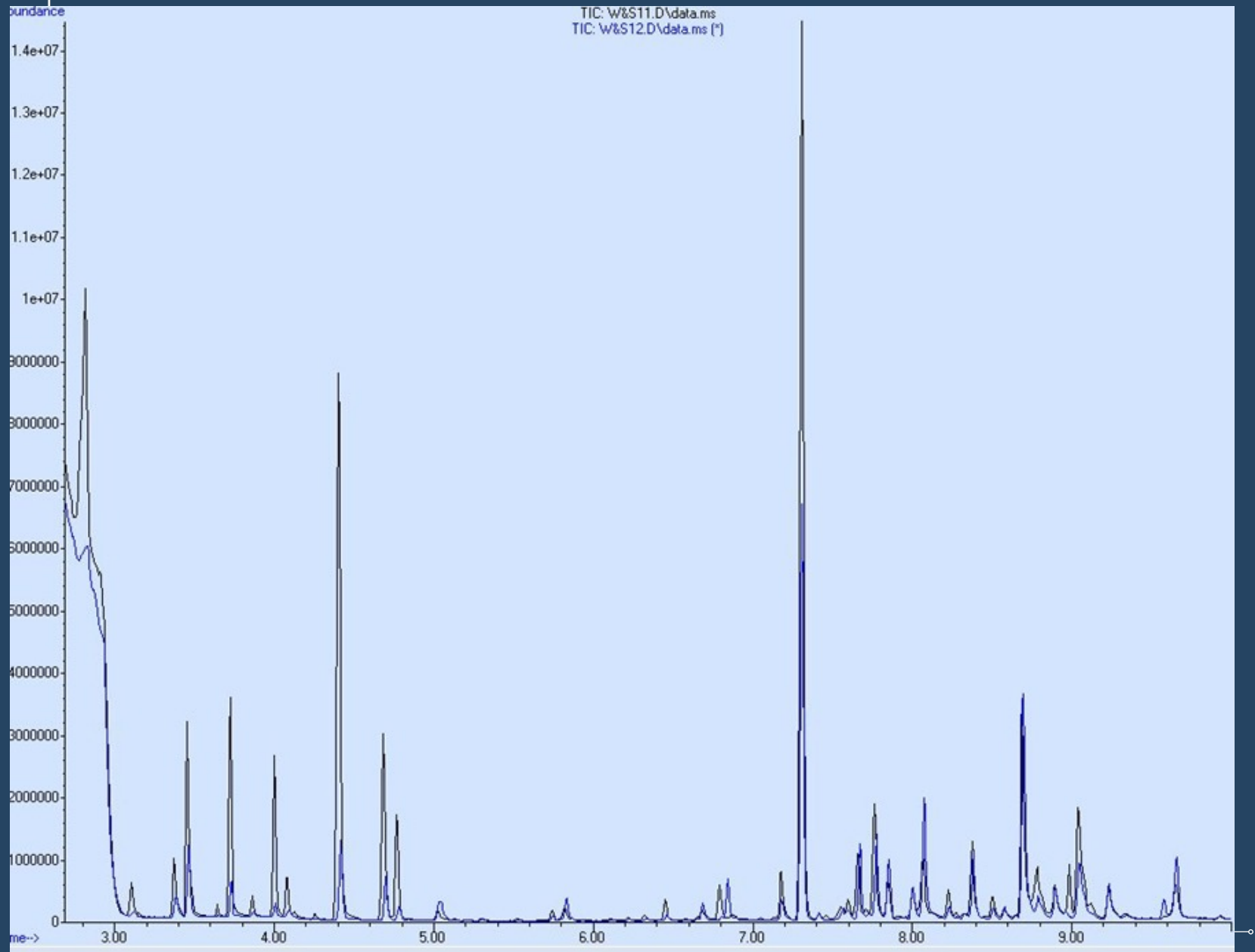
Evolution of forcing methods to match real time

- Combination of heating/cooling/shaking/UV light
- Working with clients to match forcing test time points with real time ageing
- Adjustment of forcing method to suit different product types

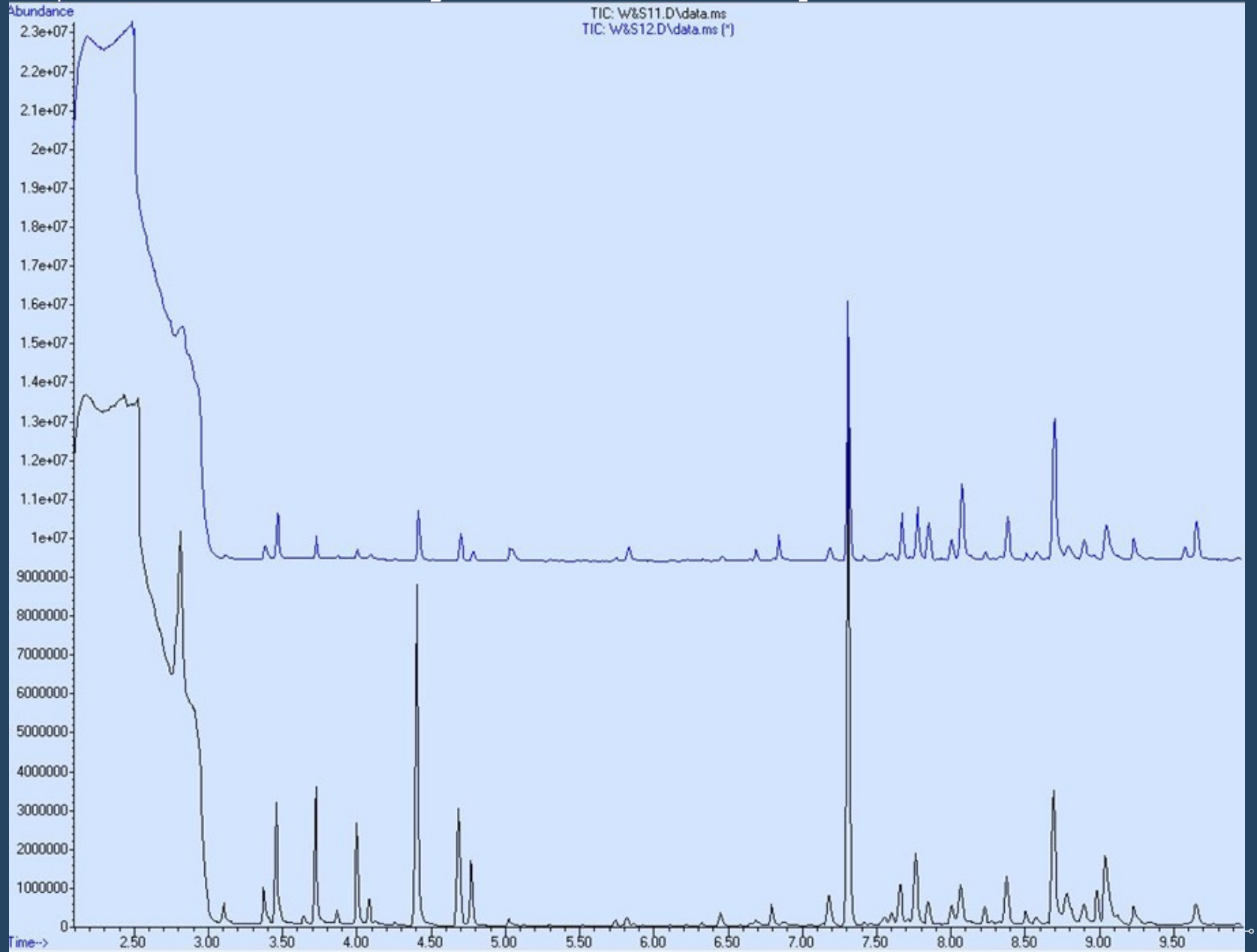
Analytical techniques

- GCMS/MS
- Computational overlay of chromatograms for comparison
- NIST database for identification of compounds

Analytical techniques continued



Analytical techniques continued



Major components and their differing peak sizes

Retention time	Relative Area %	MS Library identification	Comparative peak area
3.12	0.28	Camphene	+
3.39	0.79	Terpene	+
3.46	2.32	Terpene	+
3.73	0.99	beta.-Pinene	+
3.87	0.14	Terpene	+
4.01	0.47	D-Limonene	+
4.09	0.60	beta-Phellandrene	+
4.42	2.52	gamma.-Terpinene	+
4.70	1.39	o-Cymene	+
4.78	0.47	Terpene	+
5.03	1.25	Carene	+
5.75	0.18	Verbenyl, ethyl ether	+
6.46	0.34	alpha.-Cubebene	+
6.69	0.63	Terpineol	-
6.84	1.59	1-Hexanol, 2-ethyl-	+
7.18	0.93	Camphor	+
7.31	12.89	Linalool	+
7.57	0.71	beta.-ylangene	+
7.67	2.64	Sesquiterpene	+
7.72	0.20	beta.-copaene	+
7.77	3.15	Caryophyllene	-
7.85	2.11	Terpinen-4-ol	-
8.23	0.37	beta.-Famesene	+
8.51	0.40	Sesquiterpene	+
8.79	1.22	Sesquiterpene	+
8.90	1.41	Sesquiterpene	+
9.04	3.70	Sesquiterpene	+
9.35	0.19	Sesquiterpene	+
9.57	0.89	Anethole	+ (absent from control)
9.66	2.77	gamma.-Elemene	-