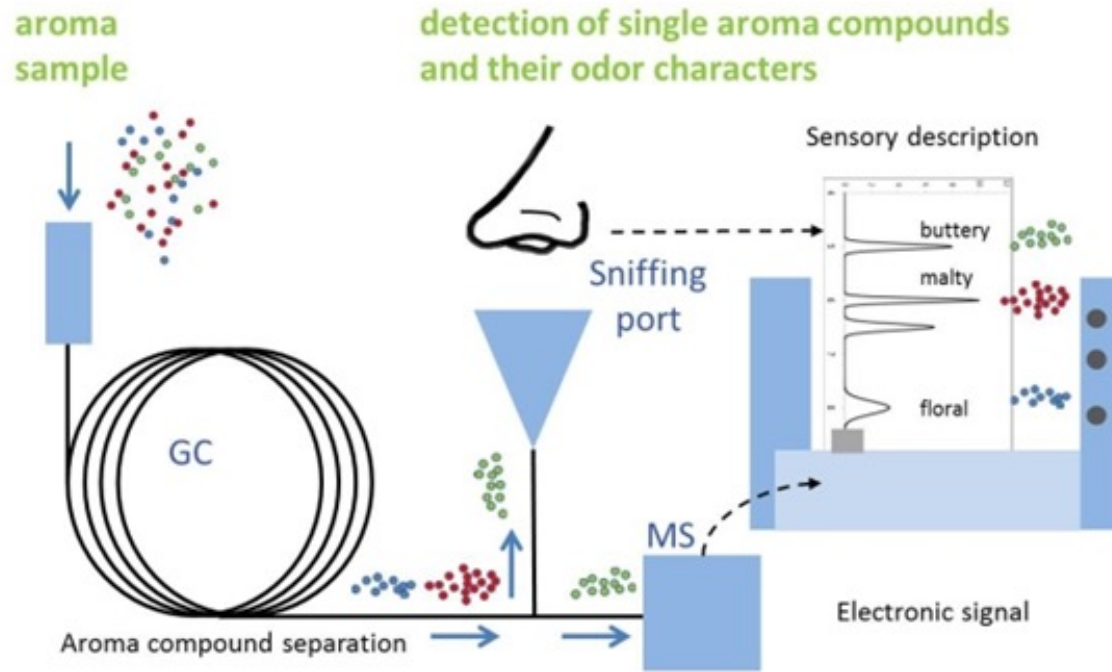


Role of Membrane Phospholipids in Flavor Development and Off-Odor Formation (Poster # 40)

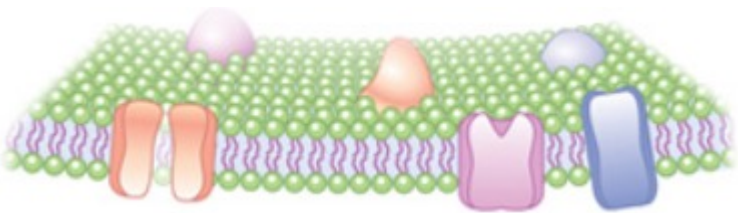
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Techniques to Identify Odor Active Compounds



Gas Chromatography – Olfactometry (GC-O)

Glycerophospholipids of the Cell Membrane Can Serve as Precursors to Odor Compounds



Glycerophospholipid bilayer membrane



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Lin and Blank

Table 2. Identification of Odorants in the Aroma Extract of Heated Aqueous Dispersions of Phosphatidylcholine (PC) and Phosphatidylethanolamine (PE)^a

no.	compd	retention index		odor quality (GC-O on DB-1701)	FD-factor (aroma intensity) ^a	
		(DB-1701)	(DB-5)		PC	PE
1	hexanal ^b	882	807	green	1 (1)	1 (1)
2	1-octen-3-one ^b	1069	986	mushroom-like, metallic	50 (2)	200 (2)
3	(Z)-1,5-octadien-3-one ^c	1087	979	geranium-like, metallic	1 (1–2)	20 (2)
4	(E)-2-octenal ^b	1173	1060	fatty, soapy	1 (1)	1 (1)
5	unknown	1212		sweet, fresh note	10 (1)	50 (1)
6	(Z)-2-nonenal ^{b,d}	1260	1151	fatty, soapy	1 (1–2)	1 (1)
7	(E)-2-nonenal ^b	1280	1164	fatty, soapy	50 (1)	5 (1)
8	unknown	1293		fishy, creamy		50 (1)
9	(E,E)-2,4-nonadienal ^b	1355	1218	fatty	5 (1–2)	5 (1–2)
10	(Z)-2-decenal ^b	1365	1254	soapy	10 (1)	1 (1)
11	(E)-2-decenal ^b	1388	1267	soapy	5 (1–2)	1 (1)
12	(E,Z)-2,4-decadienal ^b	1436	1299	fatty, soapy	20 (2)	5 (1)
13	(E,E)-2,4-decadienal ^b	1461	1312	fatty, fried	500 (3)	50 (2)
14	(E)-2-undecenal ^b	1487	1369	soapy	100 (2)	20 (2)
15	trans-4,5-epoxy-(E)-2-decenal ^{b,d}	1564	1379	metallic, green	100 (3)	100 (3)
16	(E,Z,Z)-2,4,7-tridecatrienal ^{b,d}	1740	1589	egg white-like	20 (2–3)	50 (2–3)

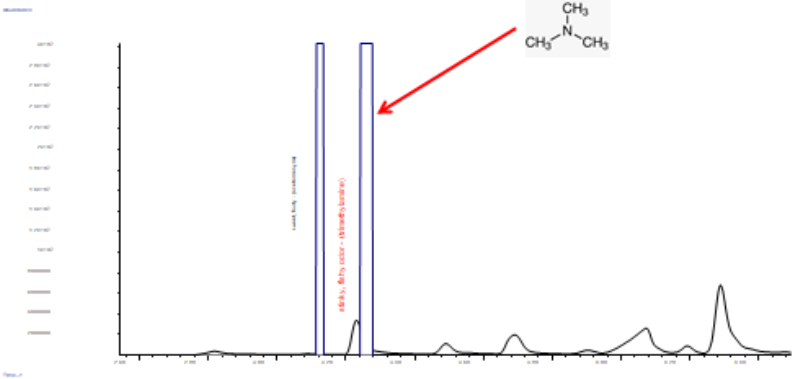
Lipoxygenase activity and metal-catalyzed oxidation on the lipid chains can result in the formation of odor-active unsaturated aldehydes with low odor thresholds

Trimethylamine (TMA) Identified : Important Odor Compound in French Roast Coffee

1.) TMA identified by SPME-GC-MS-O analysis

SPME-GCO Result

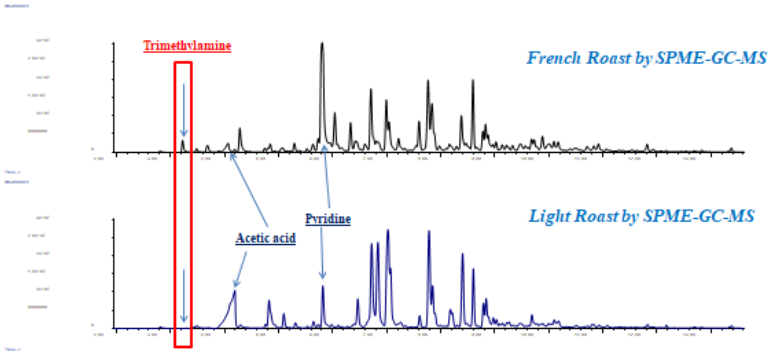
- Trimethylamine (TMA) detected as a very perceivable strong aroma contributor in French Roasted Coffee



2.) TMA is more abundant above the headspace of French roast vs light roast coffee

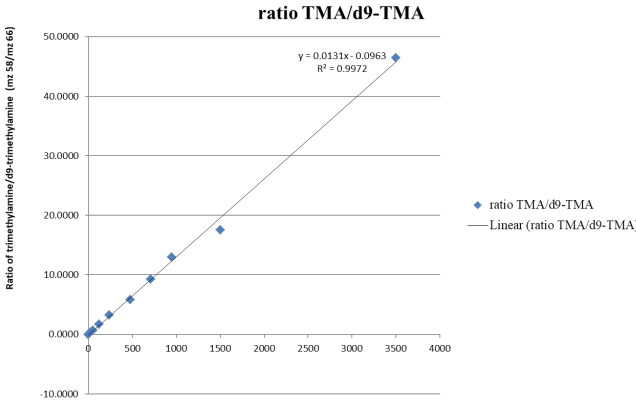
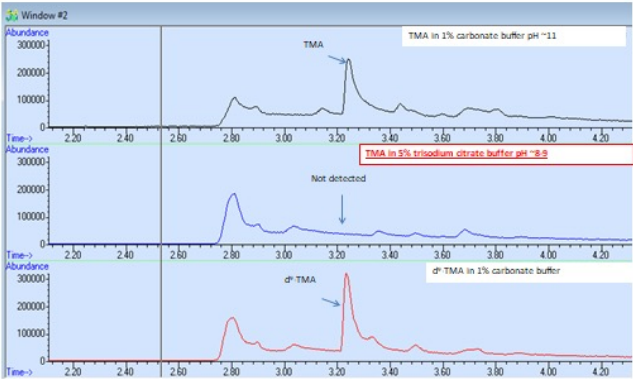
SPME-GC-MS Result

- TMA : More Prominent in Dark Roasted Coffees



3.) With carbonate buffer (pH ~11.0) and d⁹-TMA, we developed a quantitative SPME-GC-MS method on TMA levels in coffee

Carbonate Buffer Enabled Detection to TMA (SPME-GC-MS)



Brand	Coffee sample	ppm (ug/g) TMA in sample	Average (ppm)
Starbucks	Veranda blend	25.8	23.8
	Veranda blend	21.7	
	Pike Place	37.6	38.4
	Pike Place	39.1	
	French Roast	60.6	57.1
	French Roast	57.6	
	French Roast	54.7	57.1
	Starbucks Espresso Roast	56.0	
Dunkin Donuts	Dunkin Donuts Original	18.8	19.6
	Dunkin Donuts Original	20.4	
	Dunkin Donuts Midnight Roast	47.9	49.7
	Dunkin Donuts Midnight Roast	51.6	
McDonalds	McCafe	20.6	20.2
	McCafe	19.9	
Caribou	Caribou Blend Med Roast	40.4	39.8
	Caribou Blend Med Roast	39.1	
	Caribou Daybreak	25.4	23.7
	Caribou Daybreak	21.9	