XTRACTMOR

Brewery, Winery, and Distillery Equipment

Is Age Just a Number?

What does age taste like? Is liquor required to have birthdays and have seen more than one Presidential administration to be considered "the good stuff"? Hydro Dynamics, Inc. (HDI) of Rome, GA is challenging these assumptions with its technology. Using the force of cavitation, their ShockWave Xtractor™ can significantly accelerate and catalyze liquor aging, allowing flavor transitions that often take years to develop to happen in minutes to days. This allows companies to sell aged flavor liquors immediately with less loss due to evaporation.

Cavitation processed liquor before and after only 15 minutes

XtractMor is HDI's subsidiary and the exclusive marketer of the technology for brewery, distillery and wines has conducted extensive research on flavor extraction. For liquor and wine, the ShockWave Xtractor™ contributes to aging in several ways. In addition to extracting flavors and colors from wood, it also helps catalyze the esterification and oxidation reactions required for a complete aged flavor.

The aging process is as simple as pumping the product through the device either alone or with wood chips with longer retention and/or more passes resulting in increased aged flavor. HDI has work with North Mountain Supply to identify a special size wood chip ideally suited for use the Xtractor™. In addition to wood chips other flavors such as spices, fruits, coffee and tea are also possible in addition to hops for beer.

Test Data

The GC-MS example data below shows the chemical transformation that occurred in a whisky in just 15 minutes processing with the technology along with a picture showing the visual transformation. In the data you see the emergence of peaks related to aging and wood flavor. You also see the conversion of many of the higher alcohols into other alcohols with less harsh flavors and the formation of esters that correspond to banana and cherry flavors. The acetal increase is characteristic of aging and known for an "earthy and nutty" character. Finally, you see ethyl acetate formation characteristic of naturally aging with 700ppm equated with about 8 years aging. They are known to bring a bit of a harsh acetone flavor, but they're an expected part of aging.

Analysis of a White Whiskey and an Aged “Bourbon” Sample was conducted by Marsili Consulting Group using Seq-SBSE GC-TOFMS. Samples were extracted by sequential-stir bar sorptive extraction (seq-SBSE) followed by GC-TOFMS (Leco Pegasus HT) analysis.

LEGEND:

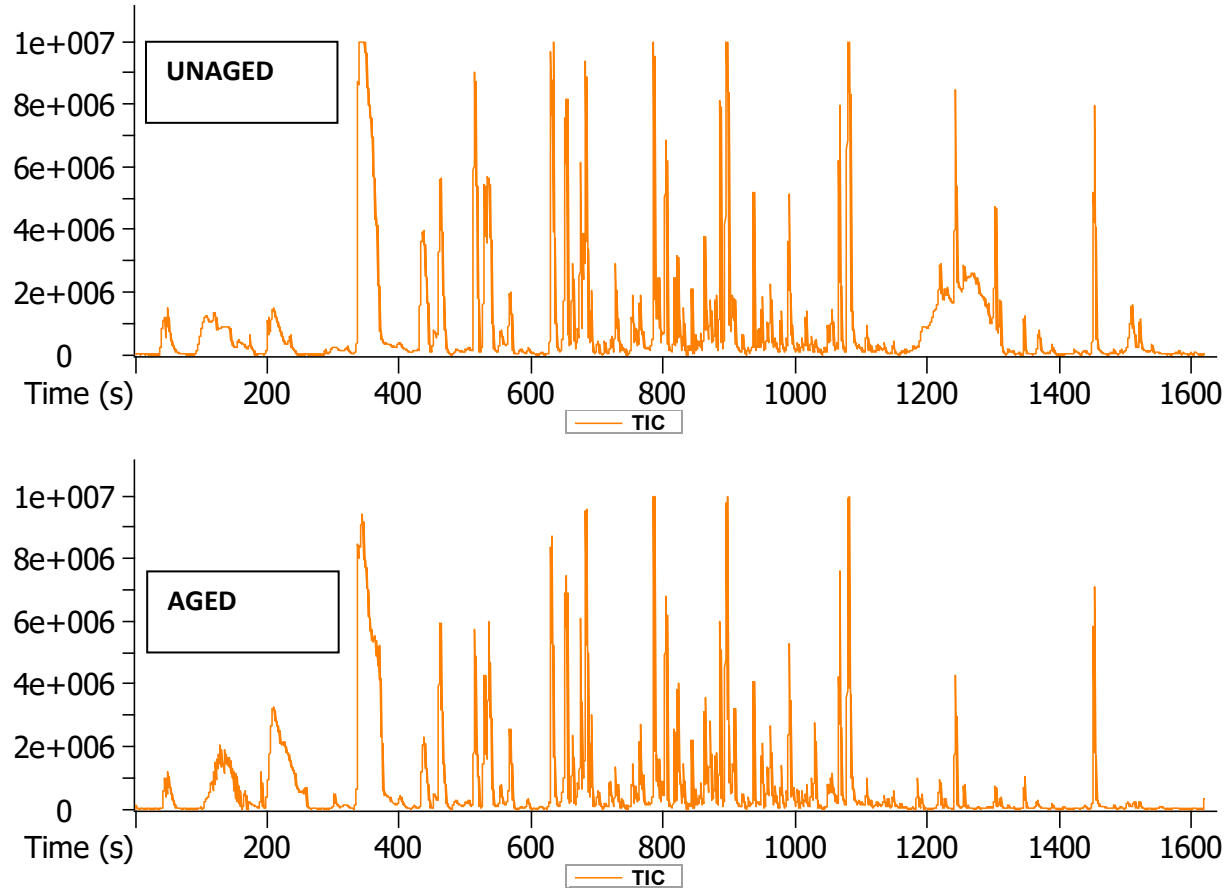
A	Acetals
CA	Carboxylic acids
ALC	Alcohols
E	Esters
O	Lipid oxidation products
S	Sugar degradation products
W	Flavorants from wood/lignin
SULF	Sulfur compounds

Chemical Class	Chemical	R.T. (s)	CAS	Qmass	Unaged (ppb)	Aged (ppb)
A	Ethane, 1,1-diethoxy- (aka acetal)	337.578	105-57-7	103	3.4	164.8
A	Propane, 1,1-diethoxy-	452.582	8/5/4744	103	7.2	4.1
A	Pentane, 1,1-diethoxy-	630.136	3658-79-5	103	54.4	64.8
A	Propane, 1,1,3-triethoxy-	769.244	7789-92-6	103	1.8	3.1
A	Hexane, 1,1-diethoxy-	787.072	3658-93-3	103	17.7	31.1
A	2-Furaldehyde diethyl acetal	869.84	13529-27-6	97	3.5	0.0
A	Heptane, 1,1-diethoxy-	885.544	688-82-4	103	0.0	8.9

ALC	1-Propanol, 2-methyl-	234.558	78-83-1	41	7.1	1.6
ALC	Acetol	288.342	116-09-6	43	5.9	17.8
ALC	1-Pentanol	398.865	71-41-0	42	0.0	4.2
ALC	1-Hexanol	421.939	111-27-3	56	1.0	0.0
ALC	2-Butanol, 3-methyl-	470.212	598-75-4	45	6.0	81.9
ALC	1-Hexanol	527.548	111-27-3	56	0.0	23.0
ALC	2-Pentanol	651.55	6032-29-7	45	92.5	59.3
ALC	1-Octanol	765.127	111-87-5	56	13.2	16.8
ALC	Phenylethyl Alcohol	822.497	60-12-8	91	0.0	52.1
ALC	1-Nonanol	871.766	143-08-8	56	9.8	11.8
ALC	1-Decanol	969.075	112-30-1	55	3.7	5.0
CA	Acetic acid	236.218	64-19-7	60	7.8	12.6
CA	Pentanoic acid	427.782	109-52-4	60	1.3	0.0
CA	Butanoic acid, 3-methyl-	495.145	503-74-2	60	0.6	1.5
CA	Octanoic Acid	872.031	124-07-2	60	0.0	20.3
CA	n-Decanoic acid	1056.13	334-48-5	60	22.9	18.0
E	Ethyl Acetate	209.293	141-78-6	43	390.6	772.1
E	Propanoic acid, ethyl ester	317.624	105-37-3	57	1.9	14.9
E	Butanoic acid, ethyl ester	380.671	105-54-4	88	2.6	10.1
E	Isobutyl acetate	402.55	110-19-0	43	0.0	35.2
E	2-Methylbutyl acetate	538.869	624-41-9	43	0.0	77.3
E	Heptanoic acid, ethyl ester	682.957	106-30-9	88	85.3	10.7
E	Ethyl 2-furoate	747.697	614-99-3	95	0.0	2.2
E	Acetic acid, 2-phenylethyl ester	962.236	103-45-7	104	20.2	0.0
E	Nonanoic acid, ethyl ester	990.024	123-29-5	88	20.6	16.5
E	Benzenepropanoic acid, ethyl ester	1048.85	2021-28-5	104	0.0	2.3
O	Heptanal	568.716	111-71-7	70	11.9	5.3
O	2-Heptenal, (Z)-	637.672	57266-86-1	83	8.0	1.9

O	1-Octen-3-ol	663.236	3391-86-4	57	0.0	17.2
O	Furan, 2-pentyl-	679.305	3777-69-3	81	76.2	23.4
O	Octanal	691.025	124-13-0	84	2.8	3.7
O	3-Octen-2-one	731.529	1669-44-9	55	0.0	4.5
O	2-Octenal, (E)-	754.072	2548-87-0	83	0.0	3.4
O	Nonanal	805.067	124-19-6	57	20.1	36.9
O	2-Nonenal, (E)-	862.968	18829-56-6	70	17.4	16.6
O	Decanal	908.584	112-31-2	57	6.1	0.0
O	2,4-Nonadienal	919.906	3/4/6750	81	2.6	0.0
O	2-Decenal, (E)-	963.53	3913-81-3	55	5.9	5.0
O	2,4-Decadienal, (E,E)-	995.303	25152-84-5	81	10.5	4.2
O	2,4-Decadienal, (E,E)-	1016.88	25152-84-5	81	23.9	9.4
O	Dodecanal	1096.2	112-54-9	55	0.6	0.0
S	Furfural	485.284	98-01-1	96	2.0	11.3
SULF	Dimethyl trisulfide	663.17	3658-80-8	126	29.1	14.6
W	t-Whiskey Lactone	997.594	39638-67-0	99	0.0	7.8
W	cis WHISKEY LACTONE	1029.5	39638-67-0	99	0.0	32.6
W	Syringol	1051.78	91-10-1	154	0.0	0.2
W	Eugenol	1059.41	97-53-0	164	0.0	1.0
W	Vanillin	1102.64	121-33-5	151	0.0	0.6
W	Isoeugenol	1106.22	97-54-1	164	0.0	0.2
W	Syringaldehyde	1310.17	134-96-3	182	0.0	0.6

The aged “Bourbon” sample had 10 acetals, 11 alcohols, 5 carboxylic acids, 24 esters, 15 lipid oxidation flavors, 2 sugar degradation products, 3 sulfur compounds, 1 terpene, and 7 flavorants extracted from wood/lignin.



Example

One of the first commercial uses of the ShockWave Xtractor™ was at Mount Hope Estate (Mount Hope) in Manheim, PA. For a Mount Hope red wine, the technology provided accelerated aging in just minutes using small oak chips which added depth and increased flavor to the wine.

Woodchips From North Mountain Supply in One Recommended Size for Xtractor

Doug Mancosky, CEO of XtractMor stated, “Mount Hope is an ideal location to demonstrate every aspect of the ShockWave Xtractor™ housing a brewery, winery and upcoming distillery at the same beautiful and historic location.” Scott Bowser, Owner of Mount Hope added, “For our production, the ShockWave Xtractor is a great triple threat. Our wine maker can add natural flavors to our wines and ciders, our brewer can accurately dry hop beer products and, as we introduce our distillery, the technology will allow us to add deep flavor profiles to our spirits. It is revolutionary equipment and, within 15 minutes of the demonstration, we knew we were sold on it.” The technology will also allow for efficiencies and flavor enhancements in Mount Hope’s other brands including the brewery and the upcoming distillery.

ShockWave Xtractor™ at Mount Hope Estate (Image courtesy of Mount Hope Estate)

Maybe age is just a number and maybe all that should matter is taste. The great thing about the rapidly expanding craft market we have today with increased choice as ultimately the customer will decide.

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