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Weekend Fragrance Classes By Jo™ Learning About Musk©

(3/21/2015)

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PART I

I guess to start this discussion I need to talk about musk in general so this is going to be one of Jo's Lessons. If you don't want to read these then skip to the end where I'll talk about this particular material.

For those that want to learn, let's start at the beginning because, in truth, musk is one of the first materials that helped to make fragrance history what it is today.

PART II

In the beginning, when only natural materials were available there were three animal materials and one plant material that found their way into the fixation hall of champions. Today none of these are legal to use and I will touch briefly on that too.

The first musk is simply called musk, but is also known as Tonquin Musk and it came from the glands of the musk deer that resides in and around Eastern Europe, mostly Russia. To harvest this musk the deer had to be sacrificed. This is a very small deer and was of little value for food so the primary reason for the kill was to harvest the musk glands. Today this practice is banned and although it has been a very long time the population of these deer are still endangered.

Next up is a substance called civet and this comes from a gland on a cat like animal called the civet. In this case the animal was not killed but captured and held in a narrow cage and provoked. When agitated the animal secretes a very odorous material into a sack near the anal gland. This material is then scraped out and held in a container until sufficient amount is gathered to take to market. Civet has a musky note but is also far more animalistic and raw than that of musk but the effects in narcotic floral accords is mandatory to achieve a similar effect to the natural perfume. Needless to say the torture and repeated assaults on these animals has also been banned for a long time. However, this animal is enjoying a wide habitat and protection and is actually encouraged in areas where coffee is grown as the ground eaten and excreted are now used to produce the most expensive coffee beans in the world. Truth.



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The final animal musk comes from the common beaver and is known as castoreum. This is also a substance that is secreted by the animal but in nature it is used to mark territories. Civilization has long used the beaver for its fur and the castoreum gland was collected upon the harvesting of this animal. In the end the use of this material fell out of favor as new and synthetic materials became available.

Finally the plant based musk note comes from a tiny little seed ambrette. For many years this plant gave up its extraction begrudgingly and the cost of this material reflected the effort needed to produce even small amounts. Up until a few years ago it was still a go to material for natural perfumers but with the new IFRA regulations this material is now banned from use.

There is also one additional material gathered from the natural world and that is ambergris. While the scent profile is hard to discern it was in the power of fixation that this material made its place in history. Unfortunately the whale from which this comes was often killed to obtain the material only to find that the strength and properties were not effective until the ambergris had floated on the surface of the ocean, open to sea and air for a long time, curing and maturing that it became useful. It never did stop the killing so today the harvesting, use and in many cases possession of ambergris is illegal without specific permit.

All of the types of musk listed above are now only a part of our world history. They have long since fallen out of favor and been replaced with synthetic versions. There are many different types of musk and all have a different purpose and chemistry. But before we begin with the Ethylene Brassylate let's take a short walk down the aisles of history and the discovery of musk in the synthetic world.

PART III

In the world of perfumery it all goes to isolation. Taking a natural substance, breaking it down into the constituents and then isolating those particular elements for use in other applications or building new scents. The power of musk was discovered very early on and so were the components in synthetic versions. Most history takes us to the early part of the 20th century but producing those isolates in mass quantity for use was another thing altogether.

For the first synthetic musk we need to look at explosives, particularly TNT. Back in the 1800's a chemist, Ruzicka Baur was working on a new explosive, a derivative of TNT. He noticed that



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some of the compounds that were produced as a result of the explosive reaction had a distinctively sweet, pleasant odor. Being able to isolate this compound "Musk Baur" was born and became the first reproducible synthetic musk available. The second nitro musk came about in 1894 and was called Musk Ketone, this musk was even close in scent profile to the natural musk's and soon gained favor as the most commonly used musk in the fragrance world.

The power of the nitro musk's came in their effectiveness at a very low percentage of the perfume formulation. In scent they all had a warm effect with a slight powdery note similar to that of amber. As good as they were they also had some undesirable effects, notably photo-toxicity and neurotoxicity not to mention the instability as intermediates in explosives. But all that said they enjoyed long use and a rich history until around the late 1980's and have now been completely removed from use in commercial perfumes. And yes for those wondering it was used and was a big part of what made Channel #5 such a huge hit in its day.

PART IV

There has never been a time and most likely will never be a time when organic chemists are not working on a new and improved musk. Every time a new one is developed there are problems detected and work-around's have to be done. The next round of musk's produced are known as Polycyclic Musk's as they contain more than one ring in their molecular structure. Developed in the mid-Twentieth century they became popular after WWII and came to be the replacements for the Nitro musk's listed above. I could go on to list about a dozen names and while there may be a few that are recognized it is not the focus of this lesson so I'll just skim by that until a later date. For now just know that some, in fact many, are still in use today despite the problems associated with them.

Besides odor profile, cedar-like notes, too floral, too fruity, and too metallic, etc. they were also shown to persist in the environment and that is what led to the creation of the new breed of musk's the Macrocylic musk's. It is here where we find the Ethylene Brassylate... the topic of this long lesson and discussion.



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PART V

First off I have to tell you it is really hard to do these lessons and keep chemistry out of the equation, but I'm really trying to make it simple and understandable. But now we really have to talk a little bit more about the chemistry to make the point of where we have come from and where we are now in the world of musk.

If you have been reading along you should have a basic understanding of the continued importance of musk. It has really been around since the beginning and will never falter in importance because there is nothing that can take its place. The most we can hope to do is create something that works and yet has a minimal impact on humans and the environment.

I know there are a lot of folks out there that want a "more natural" approach to things but let me add to this discussion that the world of perfumery has also played a very important role in medicine too. The next round of musk's are also used in creating some of our most important antibiotics too. The chemical structures are somewhat different but Macrocylic drugs are of huge importance in preventing disease and the spread of infections too.

So let's talk chemistry... A macrocycle is, as defined by IUPAC, "a cyclic macromolecule or a macromolecular cyclic portion of a molecule." In the chemical literature, organic chemists may consider any molecule containing a ring of seven, fifteen, or any arbitrarily large number of atoms to be macrocyclic.

The group of synthetic macrocyclic musk's consists of partially artificial and partially nature-identical members. For example, muscone, the macrocyclic component of the natural musk deer, is a macrocycle. Exaltolide is found in angelica root oil. The chemical structure of macrocyclic musk's suggests easy microbial decomposition which has yet to be confirmed but has already been proven to be more environmentally friendly.

These artificial musk's have a single ring composed of more than six carbons. The odor most resembles the Tonkin musk (another "large ringed" structure.) Macrocylic musk's extracted from plants consist of large ringed lactones, and macrocylic musk's derived from animals are ketones. Macrocylic ketone musk's, due to difficulties in synthesis, weren't widely produced until the late 1990's.



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It is here where most modern musk's are found and these are some of the common names for these materials. Have you ever heard of any of them?

- Ethylene Brassylate
- Exaltolide (Thibetolide) (this substance is found in Angelica Root Oil)
- Muscone
- Phantolide
- Musk Indane
- Globalide (Habanolide) metallic nuance creates radiant freshness, very popular, sometimes referred to as white musk's — hot ironed fabric feel
- Ambrettolide
- Velvione

So like with all the other musk's there is a down side. In order to make these a bit more "friendly" the cost factor has also increased and they are not as strong as the PCM's listed above.

PART VI

There is also a new generation of musk the Alicyclic or Linear Musk's. It is here where I must admit my education is lacking. While I know these materials are being developed and under new patent I don't have much more information except to say that they are considered to be a bit less stable making them more environmentally favorable. In other words they do break down...

It is in this break down that the conflict exists. To produce a fragrance that will last, or in our soaping world, have fixation, the materials have to be strong. They have to resist breaking down, and they have to stand up to a caustic environment (lye, detergent, bleach, etc.) and still come out the other end smelling fresh, clean, good, nice, strong, and even lemony. So it is a tradeoff... to achieve these factors we have to use materials that will withstand but we need to use them with an educated understanding.

Musk is the right material for the job at hand. Using the right musk at an affordable cost is what we need to look for and that is why I chose this particular type of musk. It offers strength, a low



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use amount, multiple applications, is more friendly to the environment and the cost in comparison to the other Macrocyclic musk's is affordable. One other point is that it is easy to use. Many of the musk are solid at room temperature so they require a gentle heating to liquefy before use, may not seem important but believe me it is especially when you are just about there on a fragrance formulation and reach for a musk and have to stop to "gently" heat it up for use... sigh.

So now the next post will be about the up and coming next great Fast Buy that will be offered by Fragrance Laboratory... Ethylene Brassylate.

PART VII

Ethylene Brassylate Musk

CAS: 105-95-3

Synonym:	Musk T
Soluble In:	Alcohol, DPG, and Paraffin
Stability:	Alcohol perfume, antiperspirant, fabric softener, liquid detergent, soap, toiletry applications
Odor properties:	This is a musk scent with medium odor strength. It has a bit of a powdery (think ambery), sweet, floral, ambrette, and woody scent. It is used in food products where it brings many of the same properties as the scent but also a bit of spicy vanilla too.
Substantivity:	208 hours

EB musk is a colorless to pale yellow clear oily liquid with a specific gravity of 1.04000 to 1.04700 @ 25.00 °C and a flash point of 212 °F. Shelf life is long 3-4 years or longer if properly stored in cool, dry place in tightly sealed containers, protected from heat and light.



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IFRA limitations are 10% in the fragrance concentrate

This aroma chem is not found in nature and is completely a synthetic material it is a member of the fragrance structural group macrocyclic lactone and lactide derivatives. Structurally however it is similar to that of naturally occurring musk components.

It is one of the older Macrocyclic musk elements available today but is still a work horse in the fragrance industry due to low cost and effective nature for fixation and exalting of light fragrance notes. Use for this material is across the board in the fragrance families or accords. I find it to be of great use in oriental fougere and chypre blends and is an all type fixative for any floral accord particularly in soap fragrances.

There are a lot of different musk aroma chems out there and they are some of the most expensive materials available to the perfumer. The chemistry behind them is extensive and most likely not of interest to most folks but for those interested the research is there for the investigation if so desired. One reason I chose this particular musk was because of cost, for those venturing into blending this is a good starting point. EB is fairly inexpensive, has very excellent fixation, works in soap, is a liquid, and is easy to use in formulations.

When an individual has created a fragrance blend and finds that it is just not lasting in soap this material can make all the difference. A small amount, under 10% of the total fragrance concentration can assist that fragrance to last for many more hours on the skin. Musk is a unique material, it is all about less and not more but it takes time and patience for it to work. When using it in a blend the blender must learn to walk away from the blend for a few days to allow the molecules to bind to the smaller molecules and encapsulate them to slow down the evaporative process.

If people buy the sniffy pack they can work a very basic formula out in drops and do a side by side comparison; one with the musk added and one without. In two days the results will be amazing. Not only will the fragrance intensify but it will bloom. It is like the difference between a natural flower and a synthetic flower.



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NOTE: The formula below is from Firmenich and openly shared on the internet. This is a Musk Accord used to show the power of the different musk aroma chemicals. To reproduce this formula will require all these materials many of which are proprietary to Firmenich.

Accord N° 203429 MUSK (Firmenich)

Application: Alcoholic solution: 5.00%

The addition of a small amount of EXALTENONE improves this Musk composition with an enhanced powdery effect, and produces a much richer, natural musky character.

For Fragrance Use

100.00	ETHYLENE BRASSYLATE
300.00	EXALTOLIDE® TOTAL (Firmenich)
400.00	HABANOLIDE® (Firmenich)
20.00	IRIS CONCRETE SYNTH 10%
210.00	MUSCENONETM' (Fimienich) 10%
10.00	RASPBERRY KETONE 10%
10.00	VANILLIN 10%
40.00	EXALTENONE (Firmenich)

1000.00 Total