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Weekend Fragrance Classes By Jo™

Vanilla Vs Vanillin Lesson

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The scent of vanilla is one that almost everyone is familiar with, it is in so many products that we come in contact with in our daily lives. From food to perfume, plastic bottles to medicinal products, hot, cold, or even a whiff of a passing stranger, vanilla permeates our lives. That such a flower, actually an orchid, could effect a global population is amazing. Unfortunately the inclusive effects of nature, man, and economy have all but made the real bean an elusive and expensive commodity.

Vanilla is also known as the Ice Cream Orchid is native to Central America and Mexico, it is also found in Tahiti and the Comoro Islands, East Africa and Indonesia. There are also several different species, all under the family Orchidaceae, the most common Vanilla plantifolia and Vanilla tahitensis. If sourcing natural vanilla beans it is important to know the geographical distribution as to determine the individual characteristics. The vanilla plant, Vanilla planifola, originates in subtropical forests in Mexico and parts of Central America. The Spaniards brought vanilla to Western Europe in the early 16th century. Once it was discovered that vanilla orchids could be fertilised manually, production of vanilla spread well beyond Central America. It has been grown in places as diverse as the Caribbean islands, Tahiti, Réunion, the Indonesian archipelago and Madagascar (the world leader).

The green vanilla bean or pod is not fragrant when picked. The process of fermentation and drying must take place before it turns into the fragrant deep brown vanilla pod, this process may take up to six month for it to be complete. Vanilla is not organically grown, instead it grows wild in the jungle and is often picked by local indigenous people then brought to market where it is sold in lots for pennies on the dollar. From there the beans make their way to processing plants where they are set for fermentation and eventually sold for processing, usually in the USA or in Europe.

Extraction of the vanilla is done through solvent extraction which produces a resinoid (often called an oleoresin). From this oleoresin an absolute can also be extracted. This dark brown liquid is very viscous and has a rich, sweet, slight balsamic, vanilla-like scent. Vanilla will blend with almost any other scented material but finds particular favor with woods like sandalwood or cedarwood, it softens vetiver and opopanax, and due to the balsamic note it also works well with benzoin, and other balsams, and is particularly useful in spice blends.

The term “oleoresin” is a bit subjective in this material as it is really more like a resinoid/concrete that an oleoresin. There are two standard types of oleoresins and both use a

solvent based extraction but the prepared also uses a carrier or "fixed" oil in preparation. In this case one can't be sure if you are dealing with a pure or adulterated product, what type of solvent was used, what preparation was used to obtain the oleoresin, what beans were used, what water content was allowed at the beginning of extraction, etc.

Vanilla oleoresin differs from a resinous extraction as the original plant or botanical material is live plant matter and not a resinous extudation but the end result remains quite similar; a viscous, dark brown liquid that is pourable at room temperature, has a sweet and vanilla-like odor but lacks the rich tobacco-like extract note found in the absolute. The oleoresin will be lacking the animal-like undertone and is less rich than the alcohol type extraction. Natural oleoresins are most often clear, viscous, and light-colored. An example of a natural oleoresin is Elemi; prepared oleoresins are more often heterogeneous masses of dark color thus making them somewhat more difficult to incorporate into products.

For vanilla there are only a few methods of extraction; alcohol washed vanilla absolute which originates from the hydrocarbon extraction of the oleoresin, vanilla extract using glycerin, water and ethyl alcohol, and finally a vanilla tincture. Please note there is NO essential oil on this list, there is NO vanilla essential oil – period.

For those wishing to prepare a Vanilla Extract

Use one vanilla bean for every 120 ml. of any clear liquor (vodka preferably). With a knife, split the bean open (always put your finger behind the knife). If the bean is hard, just break it into pieces. Then put the bean in the liquor. Close the bottle and leave it for about two weeks or until the vanilla bean aroma begins to come through. When you use the extract, if you don't want the vanilla seeds to show with the ingredients, use a coffee filter. You can return the seeds to the bottle. If you make ice cream, you may want to show the seeds in the finished ice cream.

You can shake the bottle several times a week to accelerate the extraction. Brandy may also be used for interesting variations.

According to US regulations, 1 l. of vanilla extract must contain a minimum of 100 gr. of vanilla beans (I reckon that each regular size complete bean must weigh between 3 and 5 gr.) of no more or 25% moisture content. Commercial extracts also include sugar and glycerin, to help to ``fix'' the aroma.

How do I prepare vanilla sugar?

Store 1 or 2 vanilla beans on an air-tight jar of granulated sugar.

Allow one month for the flavor to permeate. If the beans are always topped with sugar, the beans last for years. Use this sugar in sweet dishes. Storage temperature can be raised to 15-21 Celsius without detriment to the flavor quality of the beans.

Natural vanilla is very difficult to work with in formulations the easiest way is to create an extract or tincture (98% alcohol) and work with that material. Using the absolute or the oleoresin will be cause for frustration and additional steps to filter out the indissoluble gummy extracts that will fall out of the solution. There has been some promise in other forms of extraction, mostly dealing with co-solvents, selective extractions, moisture content of the starting material, etc. but I have yet to find a vanilla that will stay in solution. Also, keep in mind that most oleoresins are benzene extracted and so there for should not be used for any product other than an alcoholic perfume that is used in part of the formula. Benzene is quite harmful to the human body.

Most formulators tend to avoid the natural vanilla for the problems it creates, the cost involved in the quality extractions, and perhaps more importantly the ease and safety of using a vanillin or ethyl vanillin in place of the natural. Since this material is so commonly used in food, flavors and industrial products (including face and body creams and lotions), it makes sense to use something that has safety controls and does not require the solvent extraction by benzene, petroleum ether, acetone, trichloro ethylene, dichloromethane, methyl alcohol, etc. There is no way to use an oleoresin or absolute in any product without the addition of one or more of the above hydrocarbon solvents.

Of particular interest are the constituents of vanilla. There are over 200 of them but the main and common note comes from vanillin. Other constituents, many of them only at trace amounts, are hydrobenzaldehyde, acetic acid, isobutyric acid, caproic acid, eugenol, and furfural. Interestingly it is the eugenol that is such a high percentage constituent in clove bud oil that helped to make the synthetic version of vanillin a possibility. The plant makes vanillin from the amino acid phenylalanine. In the 19th century, chemists discovered ways of making it from eugenol, found naturally in cloves, nutmeg and cinnamon, and from guaiacol, which they got

from pine tar. Another source is breakdown of lignin, a strengthening material in wood and plants. Storing wine or whisky in oak casks leads to vanillin molecules appearing in the drink, and cooking over wooden fires can likewise give a vanilla edge to the flavor of food.

Vanilla is a very expensive material to work with and it is very often adulterated so to consider using it in soap making or even in cosmetic applications is, in my opinion, a waste of time and money. Natural vanilla extract costs up to 200 times that of a man-made substitute, so there is a lot of fake vanilla extract on the market. Natural vanilla is extremely thick, as most oleoresins are, and will require heat and dilution to work. There are also drawbacks of discoloration and filtration that have to be considered. In short, unless you are working on a high end, expensive perfume I would look to other options and that is exactly what leads us into the next part of our vanilla vs. vanillin class.

Vanillin

CAS # 121-33-5

Synonyms: methyl vanillin, vanillic aldehyde

Appearance:	White to off white crystalline powder
Recommendation for vanillin fragrance usage levels is up to 8% in the fragrance concentrate	
Stability:	Stable. May discolor on exposure to light. Moisture-sensitive.
Odor Type:	Vanilla
Odor Strength:	Medium, recommend smelling in a 10% solution or less
Odor Description @ 100%:	Sweet, vanilla, vanillin, creamy, and phenolic
Odor Description:	Sweet, floral, fresh and bready with a rose honey nuance
Substantivity:	400 hours
Storage:	Tightly sealed containers, protect from heat and light.
Applications:	Most widely used aroma chem, masking agent, fixative, modifier, blender, imparts sweet vanilla note

SOLUBLE IN:	dipropylene glycol
	ether
	ethyl alcohol, 1:2 in 95% alcohol
	ethyl alcohol, 1:3 in 70% alcohol
	ethyl alcohol, 4 parts in 50% alcohol
	glycerol
	glycerol, 1:20
	isopropyl myristate
	water, 1:125 in water
	water, 1gm in 100ml
	water, 6875 mg/L @ 25 °C (est)
STABILITY:	cream
	hair spray
	lotion
	powder
	soap with expected discoloration

Vanillin is a white crystalline material melting at about 81 o C. The purity is generally above 99.0% w/w on dried basis. Vanillin has a characteristic pleasant smell and taste of vanilla which is reason for its widespread use. Vanillin is a phenolic aldehyde and is the primary component of the extract of the vanilla bean.

Environmental Issues

Based on its physical and chemical properties, if Vanillin is released into the environment, it would be mainly distributed in water (98.6%) and poorly in soil (1.3%). Vanillin is readily biodegradable and will not be persistent.

Vanillin has no potential for volatilization, the emission in the air is very low (0.1%). In addition, Vanillin has a very low potential for adsorption and bioaccumulation.

On the Vanillin manufacturing site and for uses as intermediate of synthesis or in formulation, effluents have to be directed to a biological water treatment plant. The indirect exposure of humans via the environment can't be expected for synthetic Vanillin and the risk assessment showed it will have no effect on the food chain

Vanillin is one of the most important materials used in perfumery. Until the 1880s, perfumes tended to rely entirely on plant-derived molecules. Then, in 1889, Aimé Guerlain introduced the concept of a perfume with a top note, a middle note and a bottom note, the result being Jicky, a key ingredient being synthetic vanillin in the base note. Today vanillin is used to give a heavy long-lasting sweetness to fragrances and perfumes. This is represented by today's modern perfumes Tocade and Angel.

As we have learned synthetic vanillin can be made by the oxidation of eugenol, or clove oil. Today, it's typically made from the lignin obtained from cooking and chemical extraction of sulfite water (a waste product of the paper industry), or vanillin is produced from guaiacol. This method requires vanillin to be labeled as artificial flavor. Vanillin is a crystalline phenolic aldehyde C_8H_8O_3 that is the chief fragrant component of vanilla and is used especially in flavoring and in perfumery.

Vanillin is used across a multitude of industries and one of the primary uses is as a masking agent. Vanillin is a very strong odor, it is perceptible in a dilution of 0.0000002 mg per cubic meter of air. In perfumery use a rate is minimal when wishing to use as a fixative but can increase if a vanilla note is targeted. Keep in mind that controlled doses are needed to avoid a sickly sweet odor. For comparison, 1 part vanillin = 400 parts natural vanilla.

Vanillin possesses both an aldehydic and a phenolic group. For vanillin to remain stable it needs to be used in a neutral pH, outside of that it undergoes a reaction that leads to discoloration. As most soap makers know the inclusion of a vanilla type fragrance oil will result in a brown to dark brown soap closely resembling that of chocolate. This reaction is further accelerated by exposure to air and light. For those that see pictures of freshly cut soap that is wrapped in a band of dark chocolate brown while the inside remains a light cream color this is evidence of this reaction. The darkening of the interior bar will happen, various factors such as percentage

of vanillin, heat, light and even soap temperatures will affect the rate at which change happens with the end being a dark brown soap.

Competition between hand crafted soap makers and huge corporations is not feasible in cost or production. But in the case of vanillin the sweet scent of success and the dark brown of discoloration does work in our favor. Consumers would never consider a "name brand" brown soap to be appealing so the likely hood of finding a vanilla or sweet soap is not likely in commercial soaps. Handcrafted soap makers, however, have a decided advantage in this area. Consumers want and actually seek out the rustic and brown soaps that are common with handmade soaps.

In commercial marketing there is a phenomenon known as "trickle-down". This process allows for production of a range of cosmetics, toiletries, and soaps, etc. to all have the same fragrance in the product line. If the fine fragrance (perfume) contains vanillin the trickle down marketing becomes problematic and an expensive proposition. With hand crafted soaps this issue is expected and actually puts the local soap maker steps ahead of the corporate competition. And, this say's nothing about our superior quality, it's just talking scents! So "trickle-up" my soapy friends. Find your quality fragrances, sweet, spicy, floral, woody, and all the rest at Fragrance Laboratory.

Trick for working with fragrances that discolor:

For the most part it is critical for a soap maker to know how a fragrance is going to perform. Few things are worse in the soaping world than investing time, money, and resources and finding out that your fragrance misbehaved. Fragrance in product is an investment and it is critical that the soap maker and the supplier have a working relationship. The supplier needs to be able to provide reliable statistics about the fragrance products they are selling, this can be critical where fragrance is concerned. Fragrance Laboratory extensively tests all their fragrance oils and lists the expectations on their site so you can know what to expect.

Discoloration, acceleration and ricing are only a few of the obstacles that fragrance can cause in a soap. Sometime if the soap maker is aware of these issues ahead of time they can plan their strategy. In the case of discoloration perhaps it will be to work in a more natural effect, let the soap be brown. But sometimes a fragrance scent and a color are contrary. A scent like Pink Sugar is not well represented by a brown soap so in a case like that splitting the soap batter and scenting only one half while coloring the other provides a workable solution. If working with a

sweet fragrance it will have vanillin and it will turn brown so plan ahead. The good news is that vanillin is a strong fragrance ingredient and the scent will carry through the soap bar without having fragrance in both sides. So give it a swirl and find a way to make the sweet scent of success work for you.