Sensient Flavors.

Applied Implications of Flavorant Physics.

SENSIENT FLAVORS

What is a Flavor Chemist?

- On-the-job training
- 7 year apprenticeship
- Knowledge of the ~4500 raws
- Exam with Society of Flavor Chemists (SFC)

Flavor Definition.

The combination of odor and taste that creates a desired perception and marketable experience.

CFR21
The U.S. Code of Federal Regulations describes a "natural flavorant" as: the essential oil, oleoresin, essence or extractive, protein hydrolysate, distillate, or any product of roasting, heating or enzymolysis, which contains the flavoring constituents derived from a spice, fruit or fruit juice, vegetable or vegetable juice, edible yeast, herb, bark, bud, root, leaf or any other edible portions of a plant, meat, seafood, poultry, eggs, dairy products, or fermentation products thereof, whose primary function in food is flavoring rather than nutritional.

What is in a flavor?

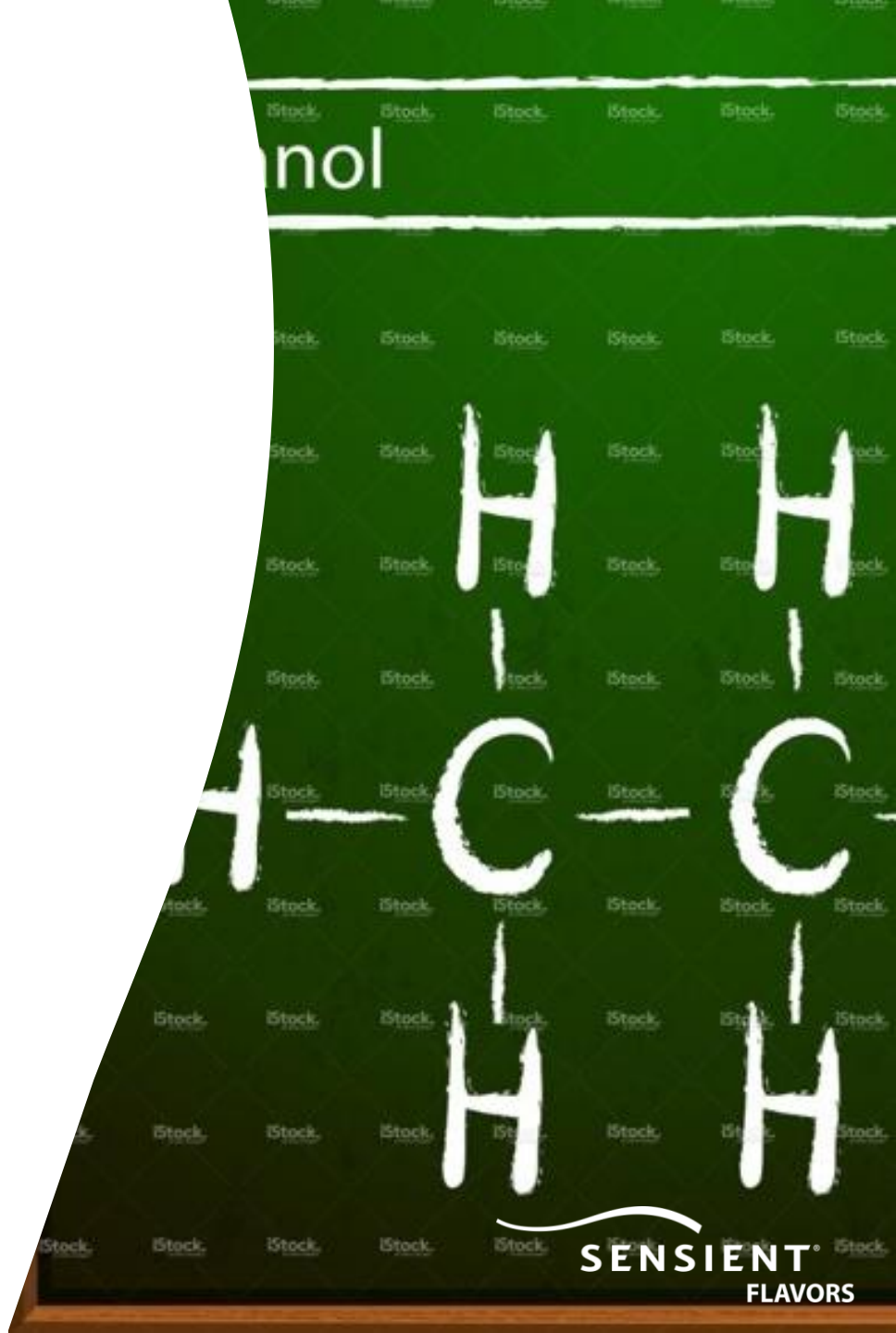
- Solvent
- Organic chemicals (natural or artificial)
- Botanicals
- Essential oils, oleoresins, aquaresins, absolutes, solid extracts, fluid extracts, etc.

- Average flavor 2-80 components

Sensient Flavors.

Solvent.

- Ethanol
- Propylene glycol
- Glycerin
- Water
- Polar solvents
- Medium Chain Triglycerides
- Vegetable oils



Comparison of Solvents.

Ethanol.

- Great solubility and miscibility
- Has more aroma
- Clean label
- TTB taxes
- Low flashpoint
- Doesn’t have fixative effect
- Medium cost

Propylene Glycol.

- Good solubility but poor miscibility
- Flashpoint >201 °F
- No tax issues
- Fixative properties
- Can taste bitter
- Can decrease aroma
- Not clean label
- Low cost

MCT and Vegetable Oils.

- Poor solubility but good miscibility
- Protection from heat processing
- Prone to oxidation
- Could be clean label
- Decreased aroma
- Medium to high cost

Sensient Flavors.

Types Of Flavors.

- Compounded
- Extraction
- Emulsion
- Reaction/Process Flavors

Sensient Flavors.

Compounded.

- Add flavor ingredients directly to solvent
- Used for both WS and OS flavors

Extraction/Wash.

- Removal/reduction of terpene hydrocarbons

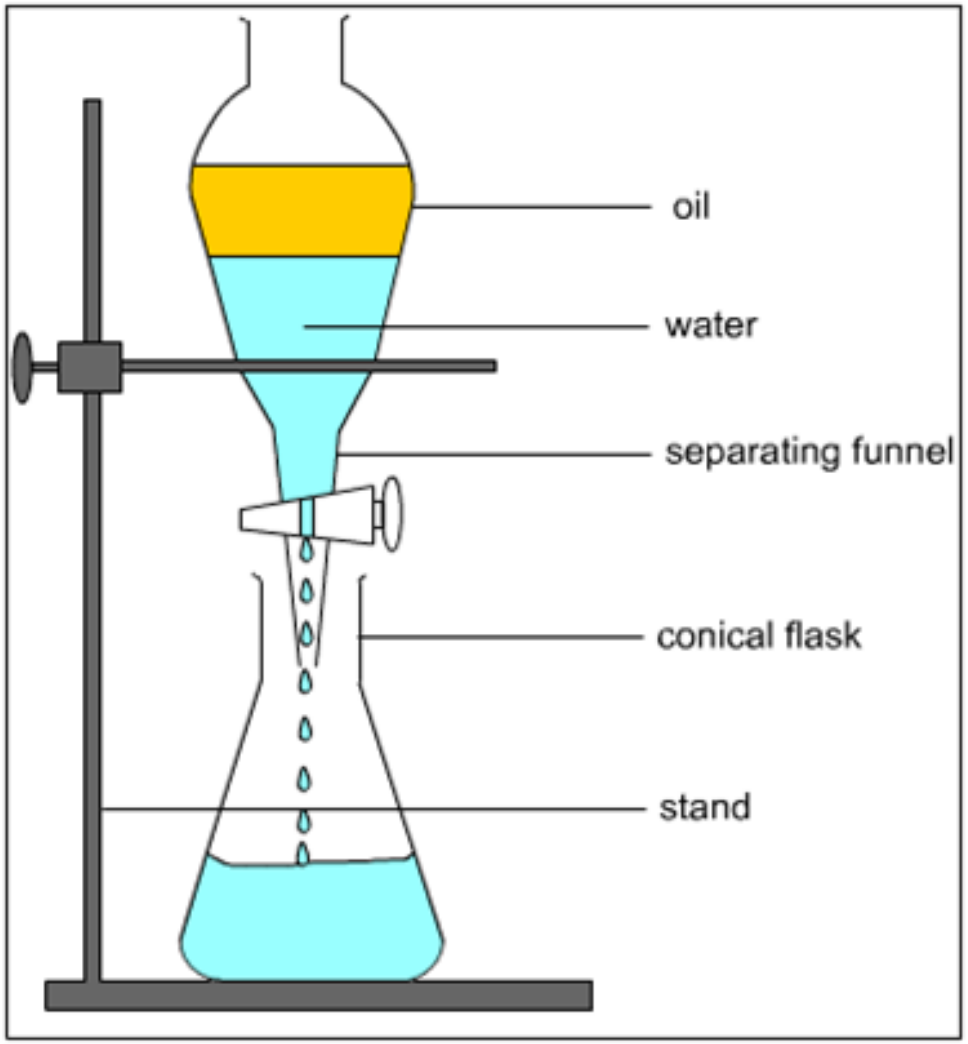
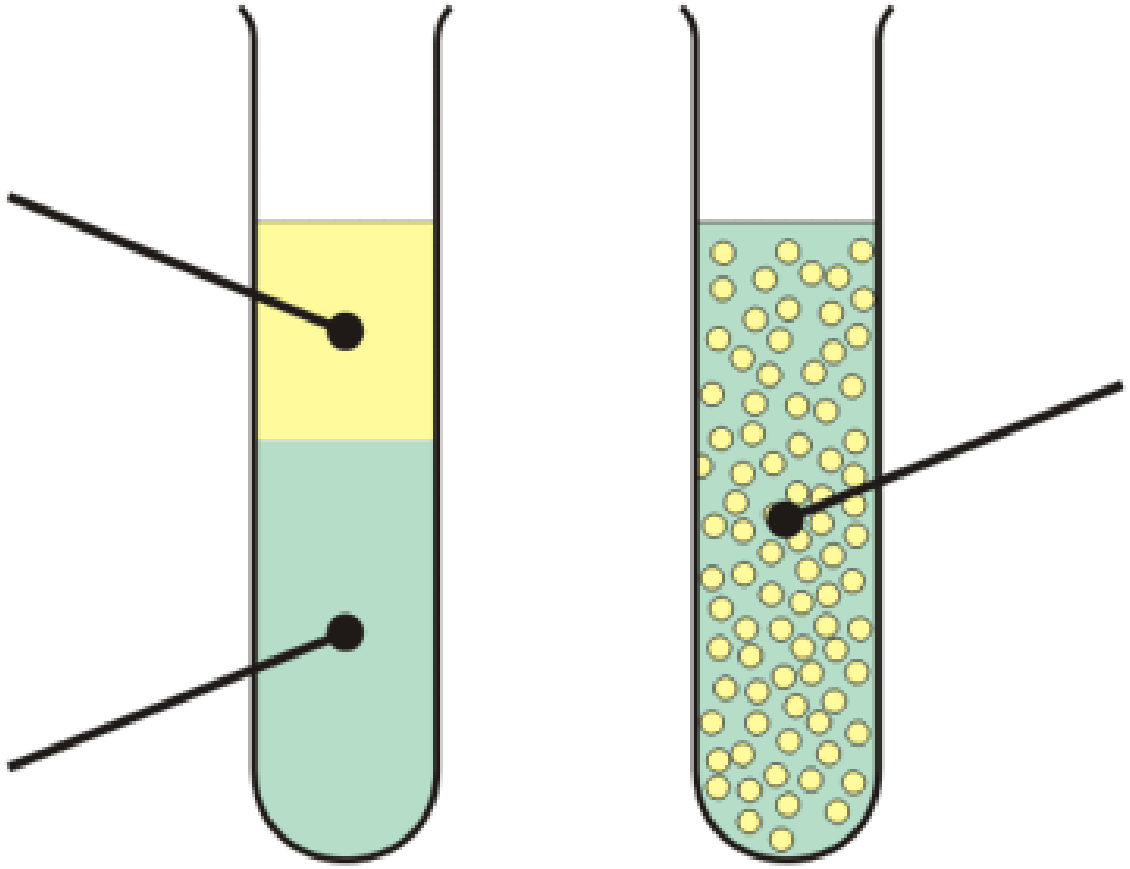


Diagram of Apparatus

Emulsion.

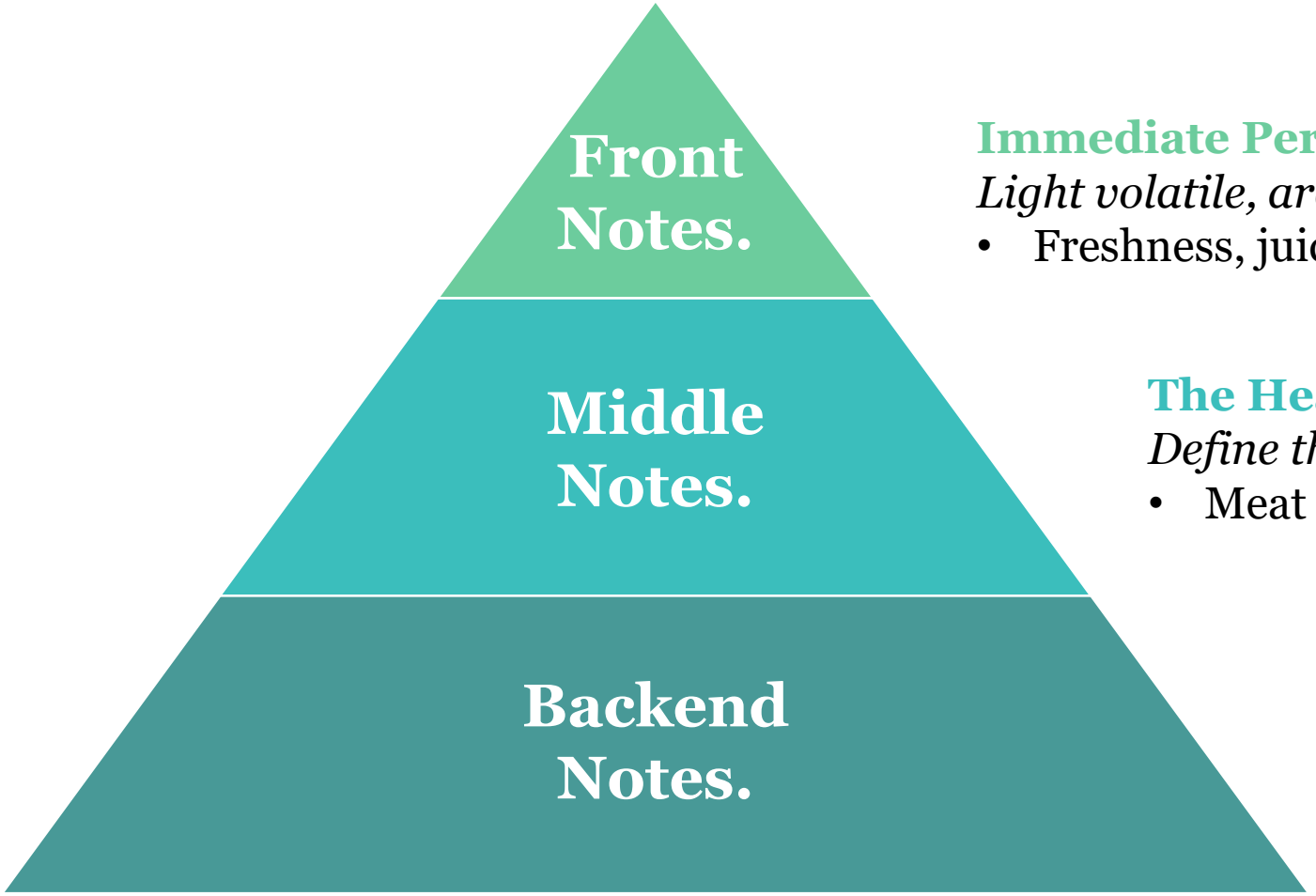
- Dispersion of oil in water



Reaction/Process Flavors.

- Combine 2 or more items typically with heat to produce browning agents
- Maillard Reaction
  - combination of reducing sugar and amino acid under heated conditions to produce pyridines, pyrazines, furans (brown notes)

Building a Flavor -Flavor Pyramid.



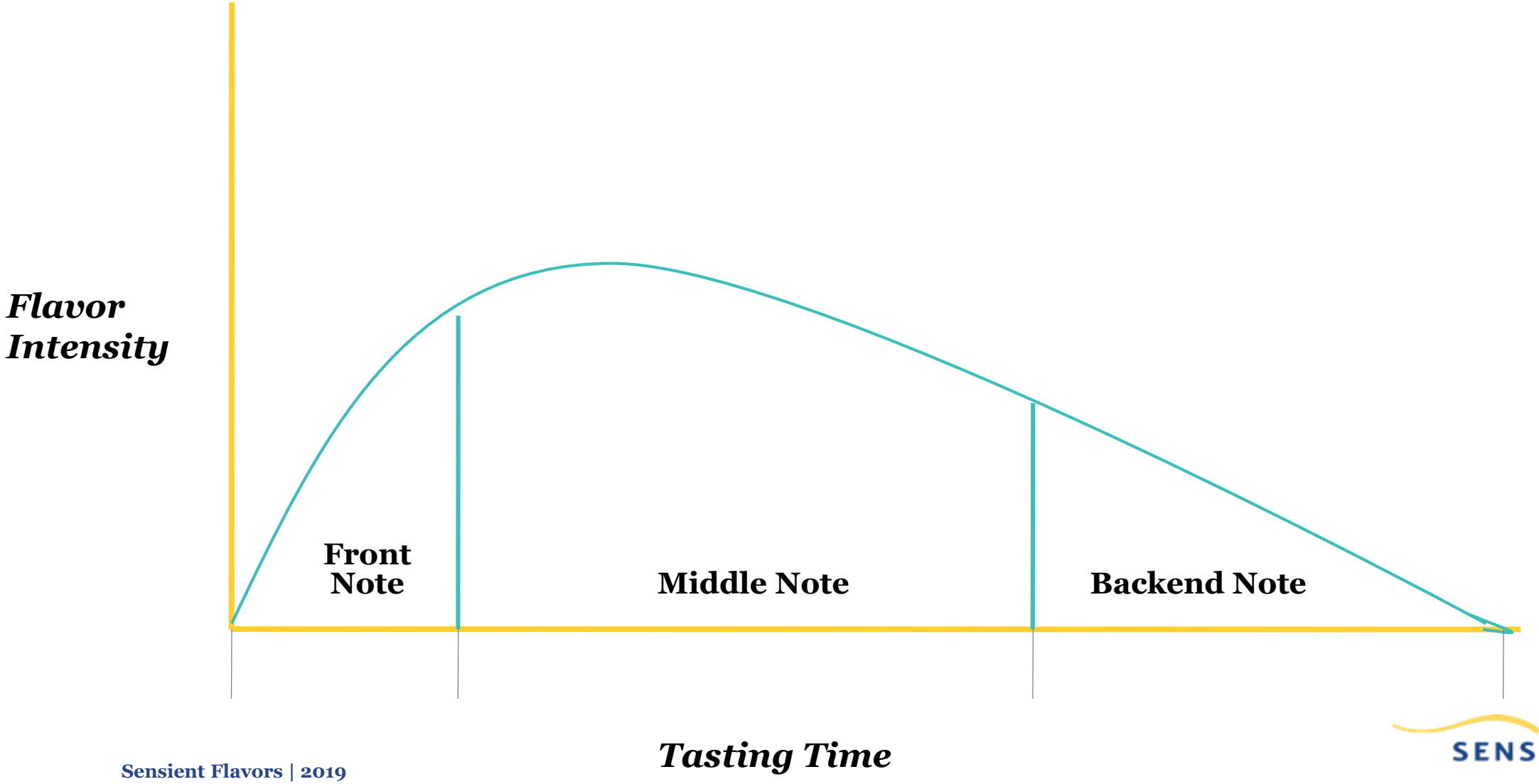
Immediate Perception
Light volatile, aromatic molecules
- Freshness, juiciness

The Heart
Define the character & profile
- Meat of the formula

Foundation
Lasting, lingering taste
- Provides body & depth

Sensient Flavors.

Flavor Taste Profile Curve.



Flavor Pyramid Characteristics.

Front Note	Middle Ground	Backend Notes
Lighter Components		Heavier Components
High Volatility		Low Volatility
Low Heat Stability		High Heat Stability
Greater Water Solubility		Lesser Water Solubility
Lesser Oil Solubility		High Oil Solubility
Lift or Front Impact		Base Note

Increasing Molecular Weight

SENSIENT FLAVORS

Using Flavors in Frozen Desserts.

Flavors.

- Low usage: more room for variegate and inclusions
- Requires precise dosing: less room for error
- 1 or 2 dimensional: adds flavor or flavor and color
- Ambient storage
- Small storage footprint

Flavor Bases.

- Higher usage
- Multi-dimensional: adds sweetness, flavor, color, acidity, texture, fruit/fruit juice, puree
- More storage: typically refrigerated

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Sensient Flavors.

Considerations when developing flavor.

- **Base/Application**
- Processing parameters
- Usage level
  - Cost
- Regulatory Restrictions
  - Halal
  - Organic
  - WFC
  - Designation

Base / Application

- **Fat content**
  - Fat “eats” flavor
- **Source of milk solids**
  - Closer to the cow is cleaner
  - More processed, like condensed milk, can add cooked or off notes
- **Stabilizers**
  - Affects flavor release

- **Mix – WS or OS flavors**
- **Variegate – WS flavors, sometimes OS if fat based (ie chocolate)**
- **Inclusions – require use of OS flavors incorporated into coating**

Sensient Flavors.

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Processing parameters

- **Pasteurization**
  - Adding before or after
- **Homogenizing**
  - Adding OS flavors
- **Over run**
  - Affects flavor delivery
  - Dilutes flavor and color so typically have to add more to account for this. Especially affects color
- **Aging**

Sensient Flavors.

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Usage Level

0.25 – 1%

- Packaging size
- High usage level causes freezing point depression
- Coffee flavors

- Cost in use

Considerations when developing flavor.

- Base/Application
- Processing parameters
- Usage level
  - Cost
- Regulatory Restrictions
  - Halal
  - Organic
  - WFC, Trader Joe's
  - Designation

Flavor Designation.

- FTNF : From The Named Fruit
- WONF : With Other Natural Flavors
- Natural Type (Natural Flavor Blend- NFB)
- Natural & Artificial (N&A)
- Artificial

Challenges.

- **Converting to natural flavors**
  - Ex: Watermelon
- **Mimicking profiles with liquid compounded flavors**
  - Ex: Caramel, peanuts, chocolate
- **Profiles that require high acid**
  - Ex: Lemon
- **Working with the Backend of ice cream**
  - Ex: Pistachio
- **Dairy base enhances fatty acid notes**
  - Ex: Strawberry

Challenges.

- **Low fat or low sugar products**
  - Flavor release
- **High sugar products**
  - Good for indulgent or candied profiles
- **Proteins**
  - Ex: Pea protein
- **Non-dairy ice creams**
  - Requires more flavor and maskers

Sensient Flavors.

Thank you!