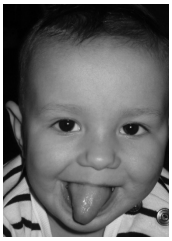
التقويم الحسي للغذاء
Sensory Evaluation of Food

Prof . Zaid Al assaf



Food Quality جودة الغذاء

- مميزات حسية جيدة
- محتوى مغذي
- غذاء آمن

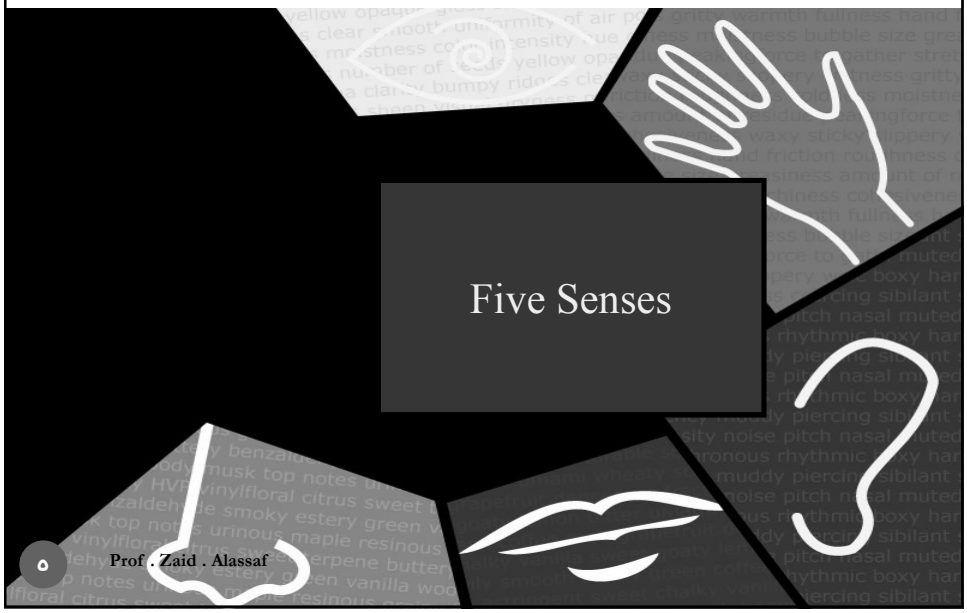
العوامل المؤثرة في اختيار المواد الغذائية وقبولها

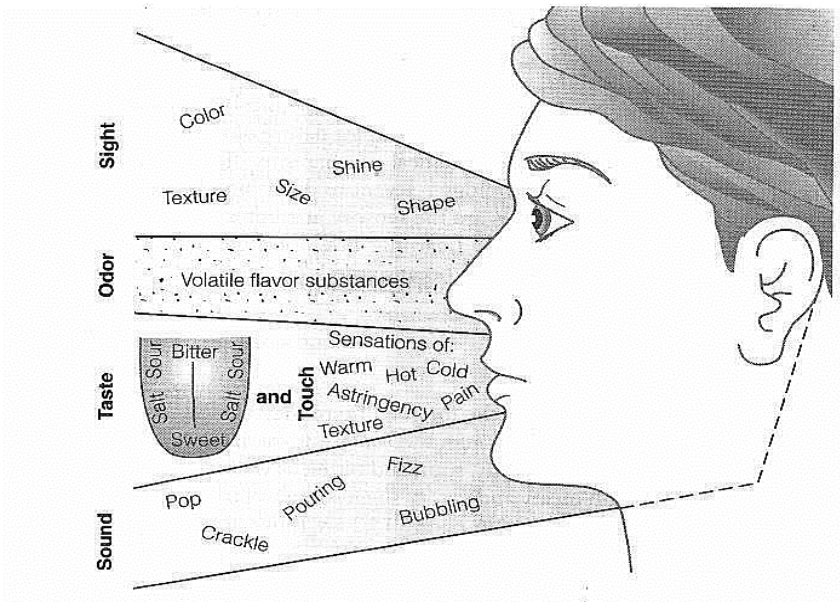
- الحالة الفيزيولوجية والعمر
- عادات الأكل والطعام والتجربة السابقة
- الحالة الثقافية والاجتماعية الاقتصادية
- المعتقدات
- أسباب شخصية
- الحالة الصحية والتغذوية

تعريف

- الفحوص الحسية هي مجموعة الاختبارات التي تتم على الصفات الظاهرية للغذاء ولا يستخدم فيها أي من التقنيات التحليلية الحديثة، أو الأجهزة المعقدة وإنما تعتمد بشكل أساسي على حواس الإنسان وقد يستخدم بعض الأجهزة البسيطة كمقياس اللون أو مقياس اللزوجة ..... أحياناً .

Sensory


Five Senses


Sight
Color
Shine
Texture
Size
Shape
Odor
Volatile flavor substances
Taste
Salt
Sour
Bitter
Sweet
Salt
Sour
and
Touch
Sensations of:
Warm
Hot
Cold
Astringency
Pain
Texture
Sound
Pop
Crackle
Pouring
Fizz
Bubbling

الخواص الحسية

- Appearance
- Aroma
- Taste
- Texture

- اللون
- الرائحة
- الطعم
- القوام

taste الطعم

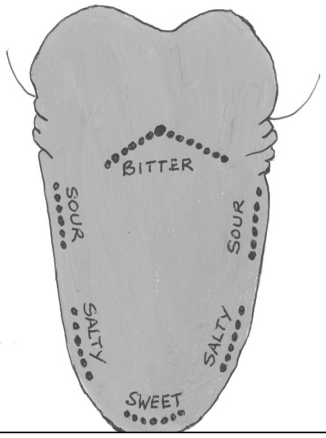
<u>Classical taste qualities:</u>

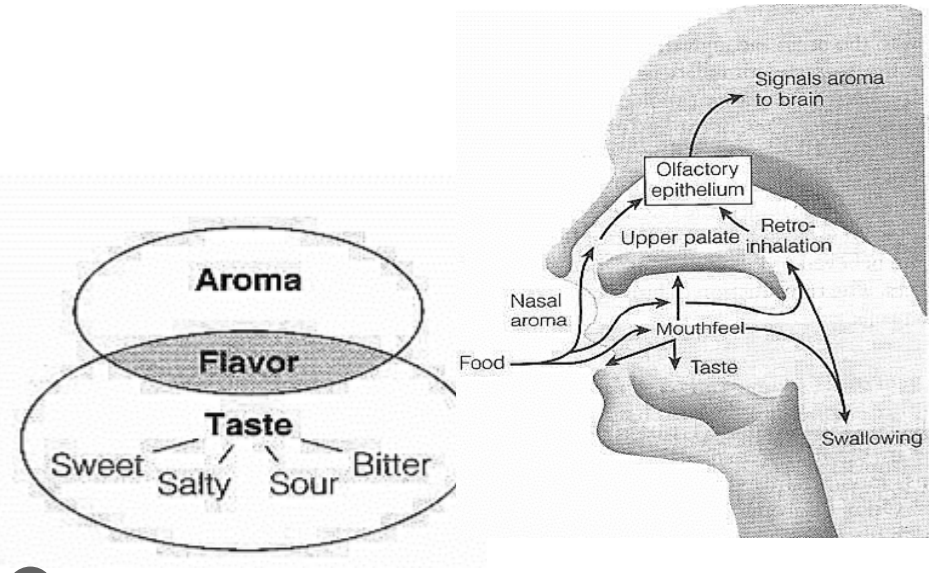
sweet, salty, sour, and bitter.

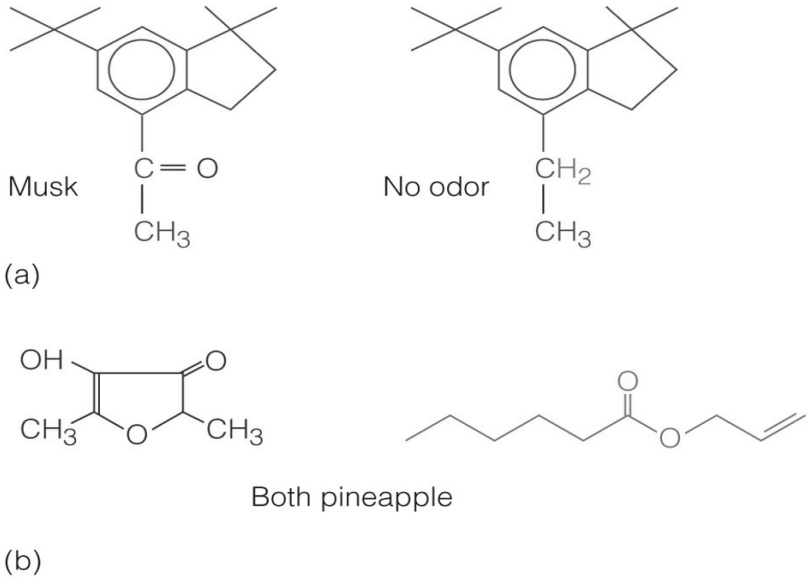
<u>Other fundamental qualities:</u>

metallic, astringent.

The Tongue


BITTER
SOUR
SOUR
SALTY
SALTY
SWEET


Aroma
Flavor
Taste
Sweet
Salty
Sour
Bitter
Signals aroma to brain
Olfactory epithelium
Upper palate
Retro-inhalation
Nasal aroma
Mouthfeel
Food
Taste
Swallowing



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Natural flavors النكهة الطبيعية

Spicy compounds التوابل

Cinnamic aldehyde = cinnamon
Eugenol = cloves
Thymol = thyme
Zingerone = ginger oil
Capsicum = peppers

النكهة الطبيعية Natural flavors

enzymatically or **chemically** produced

- **Fermentation** reactions تفاعلات التخمر
- **Microbial** enzymes

Saccharomyces Sp. *Lactobacillus* Sp. *Bacillus* Sp. Molds

Maillard flavor compounds

Glucose	+	Glutamic acid	=	chicken
Glucose	+	Lysine	=	burnt or fried potato
Glucose	+	Methionine	=	cabbage
Glucose	+	Phenylalanine	=	caramel

Fructose	+	Glutamic acid	=	chicken
Fructose	+	Lysine	=	fried potato
Fructose	+	Methionine	=	bean soup

FERMENTATION and FLAVOR التخمر والنكهة

Diacetyl ($CH_3 - \overset{O}{\overset{||}{C}} - \overset{O}{\overset{||}{C}} - CH_3$) is a compound produced by Yeasts via fermentation of carbohydrates

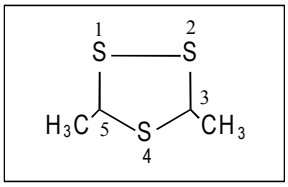
Major compound in the flavor of cultured dairy products
Butter and butter-like flavor

Compounds potentially used for diacetyl formation

Lactic acid	Oxalacetic acid
Pyruvic acid	acetyl lactic acid
Acetaldehyde	Citric acid

Flavors formation تشكل نكهة

1 – Fruits & Vegetables
2 – Cooking Meat



3, 5-Dimethyl-1,2,4-trithiolane

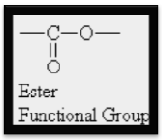
Enzymatic Reaction تفاعل أنزيمي

Green banana

↓ enzy

Fresh banana flavor

Artificial Flavors



Typically are **esters**

Esters have pleasant fruity aromas, derived from acids

a condensation reaction

ACID + ALCOHOL --> ESTER + WATER

Most artificial flavors are simple mixtures of esters

i.e.
Isobutyl formate + isobutyl acetate = raspberry

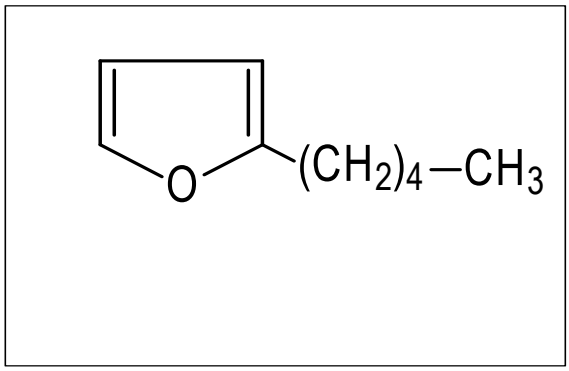
Flavors complex mixtures of many compounds

-**Amyl, butyl, ethyl esters**
- Amyl acetate = sweet fruity/ banana/ pear
- Amyl caproate = sharp fruity/ pineapple
- Amyl formate = sweet/ fruity

-**Organic acids** containing aldehydes , aromatic esters, alcohols, ketones

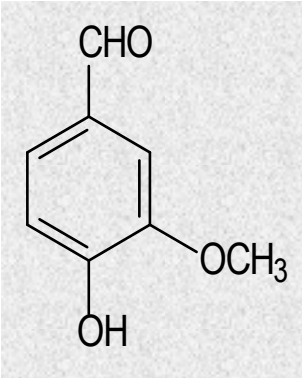
- Acetic acid = vinegary
- Propionic acid = sour milk
- Butyric acid = buttery

Soy Bean
2-Pentylfuran

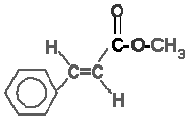


Linoleate → 2-pentylfuran

Vanilla



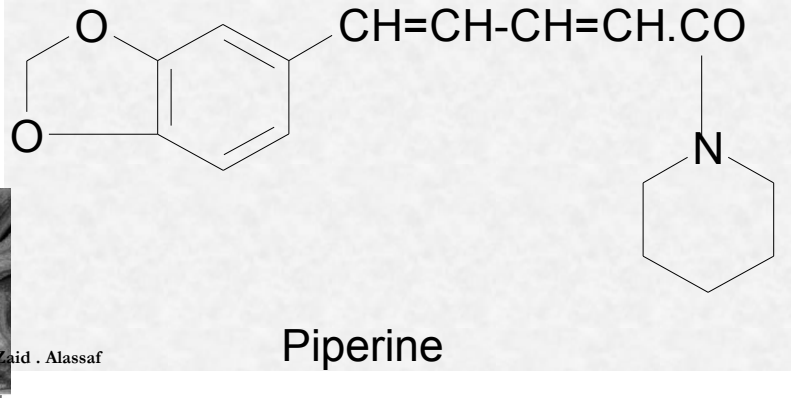
Vanilla: 4-Hydroxy-3-methoxy-benzolaldehyde

Name	Chemical Structure	Flavor
Propyl acetate	$CH_3-C(=O)-O-CH_2-CH_2-CH_3$	Pear
Octyl acetate	$CH_3-C(=O)-O-(CH_2)_7-CH_3$	orange
Isoamyl acetate	$CH_3-C(=O)-O-CH_2-CH_2-CH-(CH_3)_2$	Banana
Ethyl Butyrate	$CH_3-CH_2-CH_2-C(=O)-O-CH_2-CH_3$	Pineapple
Butyl acetate	$CH_3-C(=O)-O-CH_2-CH_2-CH_2-CH_3$	Apple
Methyl trans-cinnamate		Strawberry

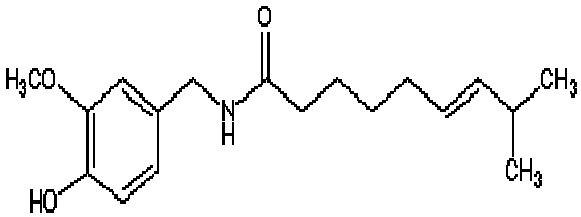
TASTE & STRUCTURE

الطعم اللاذع والرائحة الواخزة
HOTNESS Taste

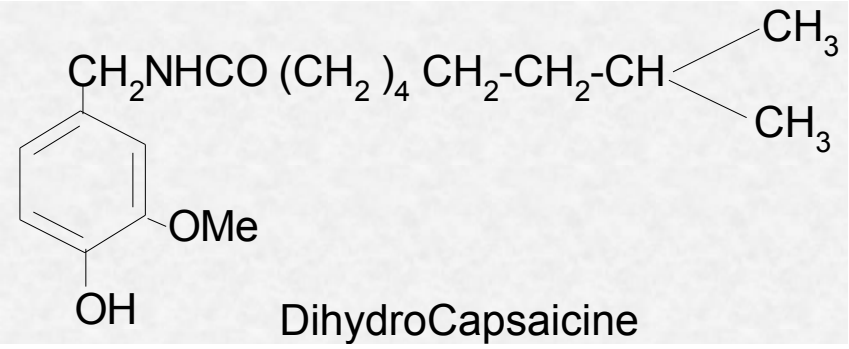
- Linking of Hotness taste with chemical structure



Capsaicin



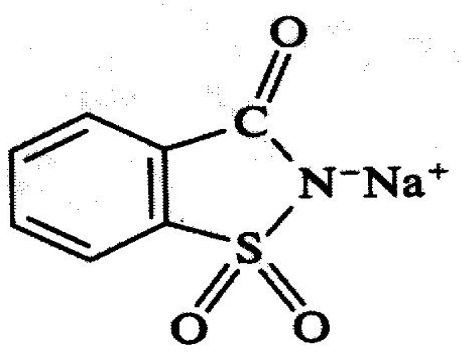
Cont



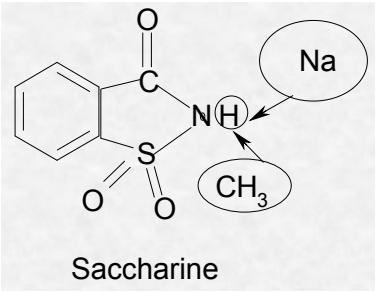
الطعم الحلو Sweet taste

Fru > Saccha > Glu > Mal >Gal > Lac

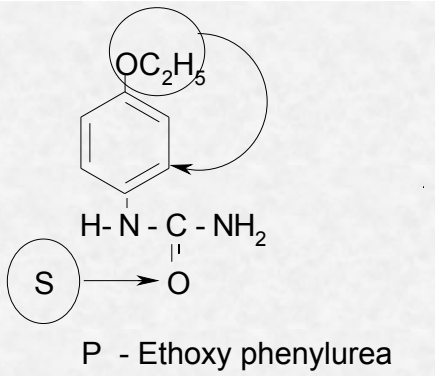
لا علاقة لـ OH بالطعم الحلو



تأثير الجذور الجانبية



الطعم الحلو والبنية الكيميائية



BITTERNESS الطعم المر

1 - **KI , $MgSO_4$**
KBr = salty + bitter

2 - peptides (dipeptide <u>leucine- leucine</u>)

3 - Alkaloids
derived from pyridine and purines

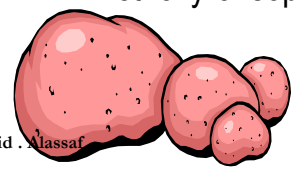
4 - GYCOSIDES

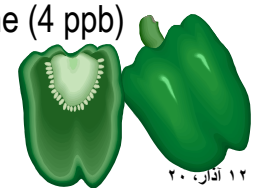
SALTY الطعم المالح

NaCl NaBr NaI KCl LiBr NaNO3 = salty

Aroma quality

- Aroma quality cannot be predicted
  - L -carvone (spearmint; 2 ppb);
    D -carvone (caraway; 100 ppb)
- Aroma intensity cannot be predicted
  - 2-methoxy-3-isobutyl pyrazine (2 ppt);
    2-methoxy-3-isopropyl pyrazine (4 ppb)





Aroma Profile مقياس الشذى

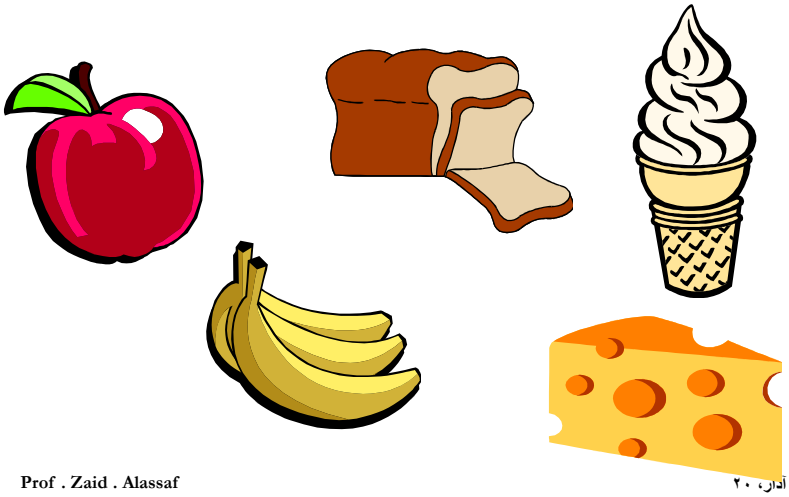
- Spices ■ رائحة التوابل
- Camphoric ■ رائحة كافورية
- Muskiness ■ رائحة مسكية
- Rosary ■ رائحة وردية
- Menthol ■ رائحة نعنعية
- Ethereal ■ رائحة اتيرية
- Tar ■ رائحة لاذعة
- Stinking ■ رائحة نتنة
- Burnt ■ رائحة محروقة
- Fruity ■ رائحة فكهية

Sight (Color)

Factors affecting the color — **العوامل المؤثرة في اللون**

- -Illumination Intensity — شدة الإضاءة
- - Shadow — الظل
- - Visual and Discriminating power of Examinee — القوة البصرية للفاحص البصرية

Foods with Different Textures



Texture

Factors affecting the texture

- Viscosity
- Glutinous
- Elasticity
- flexibility
- granulation

العوامل المؤثرة في القوام

- اللزوجة
- التجلبن
- المرونة
- المطواعية
- التحبحب

Texture Profile

- Liquid
- Fibriform
- Gelatinous
- Accumulations of cells Breakdown in the mouth
- Fatty
- Crisp or Dry
- Glassy
- Spongy

- أغذية سائلة
- أغذية ذات قوام ليفي
- أغذية هلامية
- تراكمات من الخلايا الصلبة تحرر عند مضغها سائل
- أغذية دهنية
- أغذية جافة أو هشة
- أغذية ذات قوام زجاجي
- أغذية ذات مظهر إسفنجي

طرائق الاختبار

Discrimination التمييز: Triangle, Duo-trio, Paired comparison Ranking

Descriptive وصفي قياسي: Flavor profile Texture profile QDA(quantitative descriptive analysis)

Affective تفضيل: Preference

Discrimination Tests

- Question: Are two products different from one another?
- Triangle Test: Choose the sample that is most different

A A B

342 608 194

- Duo-trio Test: Choose the sample that matches the reference

Reference (B) A B

437 821 976

- Paired Comparison Test: Which sample is sweeter?

B A

035 759

اختبارات قبول المستهلك
Consumer Acceptance Tests

- Acceptance Tests اختبارات القبول
  - Used to measure how much people like a product القبول من المستهلك
  - There are several types of scales that can be used

Sample Ballot عدد المتقبلين للمنتج ودرجة التقبل

Taste each product in the order listed. Circle how much you like the product.

Quartermaster Corp. 9-point hedonic (liking) scale

The Shirley Scale (Shirley Scale)

(used with kids)

9 LIKE EXTREMELY

8 L

7 L

6 L

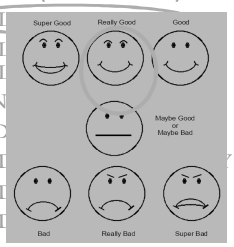
5 N

4 D

3 L

2 L

1 L



Food Labels بطاقة البيان

- Suitable Label ملائمة بطاقة البيان
- Consumer Acceptance قبول المستهلك
- Nutrition Facts الحقائق الغذائية
- Expiry date تاريخ انتهاء الصلاحية
- Factory Information's معلومات عن المصنع

Label

Nutrition Facts
Serving Size 1 cup (228g)
Servings Per Container 2

Amount Per Serving	
Calories 250	Calories from Fat 110
	% Daily Value*
Total Fat 12g	18%
Saturated Fat 3g	15%
Trans Fat 1.5g	
Cholesterol 30mg	10%
Sodium 470mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
Protein 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs:

- أنموذج من الحقائق الغذائية الواجب ذكرها على بطاقة البيان

شكراً

Thank You