PENGUNAAN BAHAN TAMBAHAN MAKANAN (BTM)
PADA PROSES PENGOLAHAN PANGAN

TIM DOSEN

ITP, PS BIOTEK
2012
Content

1. Food Coloring
2. Food Flavoring
3. Food Emulsifier
4. Gelatinizing Agent
5. Food Antioxidant
6. Surface Active Agent
7. Antimicrobial
Content

8. Chelator
9. Anti caking
10. Firming agent
11. Clarifying Agent
12. Bleaching agent
13. Humectant
14. Improver
1. FOOD COLORING

**DEFINITION:**

→ Any substance that is added to food or drink to improve or change its color.

**FUNCTION:**

- Offsetting color loss due to light, air, extremes of temperature, moisture, and storage conditions.
- Masking natural variations in color.
- Enhancing naturally occurring colors.
- Providing identity to foods.
- Protecting flavors and vitamins from damage by light.
- Decorative or artistic purposes such as cake icing.
1. FOOD COLORING

ORIGIN AND SUITABILITY OF COLORS

→ Serious poisoning occurred from the use of such dangerous inorganic pigments

  *Example*: copper sulfate, copper arsenite, red lead, cinnabar

→ Similar colors such as: red oxide of iron, ultramarine, thitanium dioxide (which are still used occasionally) were harmless.
1. FOOD COLORING

“Primary colors & secondary colors ???”

<table>
<thead>
<tr>
<th>Primary</th>
<th></th>
<th>Primary</th>
<th></th>
<th>Complementary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>+</td>
<td>Yellow</td>
<td>→</td>
<td>Orange</td>
</tr>
<tr>
<td>Yellow</td>
<td>+</td>
<td>Blue</td>
<td>→</td>
<td>Green</td>
</tr>
<tr>
<td>Blue</td>
<td>+</td>
<td>Red</td>
<td>→</td>
<td>Purple</td>
</tr>
</tbody>
</table>

Young children like bright, vibrant colours (reds, yellows and oranges etc...) whilst Older people like more gentle or sophisticated colours and tones such as shades of blue.
COLOR CATEGORIES

- **SYNTHETIC**
  - no similar natural color
- **SYNTHETIC**
  - identical to a natural color (ex: riboflavin, Carmine, Carotenoid)
- **NATURAL**
  - obtained from plants or animals
# Natural Colors Classification

<table>
<thead>
<tr>
<th>CLASS</th>
<th>COLORING EXTRACT</th>
<th>PIGMENTING SUBSTANCE</th>
<th>PROPERTIES &amp; DOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carotenoids</td>
<td>Annato, Carrot oil, Vegetable juice, Paprika, Saffron</td>
<td>Bixin, Beta carotene, B-carotene, lycopene, Capsanthine, capsorubine, Crocetine</td>
<td>Fat soluble, yellow to purplish red, max. dose 100 mg/Kg</td>
</tr>
<tr>
<td>Quininoids</td>
<td>Cochineal</td>
<td>Carminic acid</td>
<td>Sol water, 100 mg/kg</td>
</tr>
<tr>
<td>Porphyrins</td>
<td>Vegetable juice</td>
<td>Chlorophylls</td>
<td>Slighty sol. in water, 500 mg/kg</td>
</tr>
<tr>
<td>Betalaines</td>
<td>Vegetable juice, Beet powder</td>
<td>Betanines (beet)</td>
<td>Water soluble, red-purple, 500mg/kg</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>Fruit juice, Grape skin extract</td>
<td>Anthocyanins</td>
<td>Water soluble, red (acid), bluish (alkaline) max dose 500 mg/kg</td>
</tr>
<tr>
<td>Others</td>
<td>Riboflavin, Tumeric</td>
<td>Riboflavin, Curcumin (slightly sol. in water)</td>
<td>Water sol, 50 mg/kg Alcohol &amp; fats solubel, 50 mg/kg</td>
</tr>
</tbody>
</table>
## Artificial Dye

<table>
<thead>
<tr>
<th>TYPE</th>
<th>COLOR</th>
<th>FD&amp;C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brilliant Blue FCF, E133</td>
<td>Blue shade</td>
<td>FD&amp;C Blue No. 1</td>
</tr>
<tr>
<td>Indigotine, E132</td>
<td>Dark Blue shade</td>
<td>FD&amp;C Blue No. 2</td>
</tr>
<tr>
<td>Fast Green FCF, E143</td>
<td>Turquoise shade</td>
<td>FD&amp;C Green No. 3</td>
</tr>
<tr>
<td>Allura Red AC, E129</td>
<td>Red Shade</td>
<td>FD&amp;C Red No. 40</td>
</tr>
<tr>
<td>Erythrosine, E127</td>
<td>Pink Shade</td>
<td>FD&amp;C Red No. 3</td>
</tr>
<tr>
<td>Tartrazine, E102</td>
<td>Yellow</td>
<td>FD&amp;C Yellow No. 5</td>
</tr>
<tr>
<td>Sunset Yellow FCF, E110</td>
<td>Orange shade</td>
<td>FD&amp;C Yellow No. 6</td>
</tr>
</tbody>
</table>
Certified Colors

- Water soluble (Dye) or Lipid soluble (Lakes)
- Natural or synthetic color
- Ex. FD &C red no 3 & 40, FD &C blue no 1, FD&C Yellow no 5&6
- Future Alternative Color ???

FD & C ???
Blended to created desired shade of color
<table>
<thead>
<tr>
<th>CLASS</th>
<th>COLORS</th>
<th>CLASS</th>
<th>COLORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quinoline</td>
<td>Yellow</td>
<td>Tartrazine</td>
<td>Yellow</td>
</tr>
<tr>
<td>Erythrosine</td>
<td>Red</td>
<td>Sunset Yellow FCF</td>
<td>Orange</td>
</tr>
<tr>
<td>Indigotine</td>
<td>Red/blue</td>
<td>Ponceau 4 R</td>
<td>Red</td>
</tr>
<tr>
<td>Brilliant blue FCF</td>
<td>Blue</td>
<td>Red 2 G</td>
<td>Red</td>
</tr>
<tr>
<td>Patent blue V</td>
<td>Blue</td>
<td>Azorubine</td>
<td>Red</td>
</tr>
<tr>
<td>Green S</td>
<td>Green/blue</td>
<td>Amaranth *</td>
<td>Red/blue</td>
</tr>
<tr>
<td>Brilliant black BN</td>
<td>Purple/black</td>
<td>Brown FK</td>
<td>Yellow/brown</td>
</tr>
<tr>
<td>Brown FK</td>
<td></td>
<td>Brown HT</td>
<td>Brown</td>
</tr>
<tr>
<td>Brown HT</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Those colors were approved by U.K. Amaranth → delisted from U.S lists
**US CERTIFIED COLORS**

<table>
<thead>
<tr>
<th>Colors</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>FD &amp; C Red no 3</td>
<td>Permanent</td>
</tr>
<tr>
<td>FD &amp; C Red no 40</td>
<td>Permanent</td>
</tr>
<tr>
<td>FD &amp; C blue no 1</td>
<td>Permanent</td>
</tr>
<tr>
<td>FD &amp; C blue no 2</td>
<td>Permanent</td>
</tr>
<tr>
<td>FD &amp; C Green no 3</td>
<td>Permanent</td>
</tr>
<tr>
<td>FD &amp; C Yellow no 5</td>
<td>Permanent</td>
</tr>
<tr>
<td>FD &amp; C Yellow no 6</td>
<td>Permanent</td>
</tr>
</tbody>
</table>

**EUROPEAN**

<table>
<thead>
<tr>
<th>Colors</th>
<th>Dose (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carmoisine E122</td>
<td>Max 20</td>
</tr>
<tr>
<td>Ponceau 4 R E124</td>
<td>Max 50</td>
</tr>
<tr>
<td>Erythrosine E 127</td>
<td>Max 50</td>
</tr>
<tr>
<td>Riboflavine E101</td>
<td>Max 50</td>
</tr>
<tr>
<td>Brilliant green E142</td>
<td>Max 100</td>
</tr>
<tr>
<td>Patent blue V E131</td>
<td>Max 50</td>
</tr>
<tr>
<td>Indigo carmine E132</td>
<td>Max 100</td>
</tr>
<tr>
<td>Black PN E151</td>
<td>Max 50</td>
</tr>
<tr>
<td>Carotenoids E160</td>
<td>Max 100</td>
</tr>
<tr>
<td>Canthaxanthine</td>
<td>Max 500</td>
</tr>
</tbody>
</table>
2. FLAVORING

- **DEFINITION**:  
  → The *sensory impression* of a food or other substance, and is determined mainly by the chemical senses of *taste* (tongue) and *smell* (nasal cavity).  
  → The taste of food is limited to *sweet, sour, bitter, salty*, and *savory*.

- **FUNCTION**:  
  - Impress sense of taste and smell  
  - Enhance natural/original flavor in food product  
  - Offsetting flavor loss due to food processing
Flavoring Materials

- Naturally occurring plant materials
  - Herbs, spices, vanilla, fruits, nuts, aromatic vegetables
- Derivate from Natural Substance
  - Extracts, essences, essential Oils, oleoresins, fruit juices, concentrates.
- Flavor Isolate
  - Eugenol from clove leaf oil, citral from lemon grass oil.
- Synthetics by chemically
  - ex: vanillin from wood lignin
Type:
- **Natural flavor:** Vanilla, citrus oil, essential oil
- **Fruit flavor:** Bananas, apples & berries, etc.
- **Acid:** Citric acid, tartaric acid or volatile oil and aromatic chemicals.

- Fruit flavor mixed with synthetic flavor → *(improve original flavor, more stable, resistant to high temperature).*
- Caramel, honey, brown sugar, maple sugar, chocolate, milk, cream, butter = *specific contributor* of candy flavor.
Ex. Formula of Apple Flavor:

- Geranilvalerat 10%
- Geranil n-butirat 8%
- Geranil propionat 8%
- Linalil format 10%
- Isoamilvalerat 15%
- Vanilin 8%
- Alylkaprilat 6%
- Geranil aldehid 5%
- Asetil dehida 6,5%
- Metil siklopentonolon valerat 8%
- Alfamentil furil akroelin 2%
- Isoamil butirat 13,5%
3. EMULSIFIER

**DEFINITION**:

→ Substance which **stabilizes** an emulsion by increasing its kinetic stability

→ One class of emulsifiers is known as surface active substances or surfactants

**TYPE**:

Lecithin (egg yolk, soy), honey, and mustard, where a variety of chemicals in the mucilage surrounding the seed hull act as emulsifiers, sodium stearoyl lactylate
**FUNCTION :**

- Control of viscosities
- Slab releasing agent
- Decelerate of candy ossification, ex: starch base candy
- Inhibit of fat bloom
- Decelerate of Glaze less

**FUNCTION :**

- Improve palatability
- Improve visibility
- Stabilize the emulsion (flavor-oil)
- Inhibit the separation between product and its constituents (ex: oil)
- Control grain and crystal
Emulsifier in Food

- **Oil-in-water (o/w) emulsions** are common in food.
- **Vinaigrette** – vegetable oil in vinegar; if prepared with only oil and vinegar (without an emulsifier), yields an unstable emulsion.
- **Mayonnaise** – vegetable oil in lemon juice or vinegar, with egg yolk lecithin as emulsifier.
- **Hollandaise sauce** – similar to mayonnaise.
- **Crema in espresso** – coffee oil in water (brewed coffee), unstable.
4. GELATINIZING

- **DEFINITION:**
  - Substances that form gels and foams or act as stabilizers.
  - Some of these may be used as glazing coating.
  - Increase viscosity, provide body, increase stability, and improve suspension in aqueous solution.
  - Frequently are based on: polsaccharides (starches, vegetable gums, pectin, alginate, karegenan), or proteins.
## Gelatinizing Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Thickener</th>
<th>Stabilizer</th>
<th>Emulsifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alginic acid</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Sodium alginate</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Potassium alginate</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Calcium alginate</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Agar</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Carrageenan</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Eucheuma seaweed</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Locust bean gum (Carob)</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Gelatine</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>
AGAR-AGAR

- Eastern name of seaweed.
- Extracted from red seaweed “Gelideum”.
- Japan was the only supplier until 1939.
- Agar can be produced also from Gigartina, Gracilaria, Furcellaria, Chondrus

- Agar is basically the sulfuric ester of a long chain galactan.
- The seaweed is extracted by boiling → straining → extruded into powder
- The jelly forming power is high
- Conc. 0,5% → firm jelly
Jelly production using *agar* → texture unstable

→ Syneresis

→ *Pectin, starch, gum* arab can be used as substituents in jelly production
ALGINATES

- Discovery of Alginic acid which contain iodine → increase alginate production.
- Seaweed “Macrocystis pyrifera” → washed → milled → hot alkali treatment → clarification → added with CaCl2 → precipitate Ca-alginate.

APPLICATION:
- stabilizer, emulsifier, thickener of ice cream, chocolate, milk suspension, cake icings and filling, chocolate syrup
- Alginate gels do not disperse in the mouth
CARRAGEENAN

- Seaweed “Chondrus crispus and Gigartina stallata”.
- Class: linear polysaccharide.
- Based on the structure: kappa, iota, lambda

- Carrageenan forms gels in water at conc. 0.5%
- Application: stabilizers in food industry, additive in chocolate syrup.
Xanthan Gum

- Produced by biopolymerization “fermentation by *Xanthomonas campestris*”.
- High molecular weight natural polysaccharide.
- **Application**: liquid (soy sauce), pastes, syrups

- Product filling in bakery
- **In confectionery** → its use to date has been inadequately pursued.
- It can be combined with guar and carob (locust bean) gum → to increase the viscosities.
Gum Acacia, Gum Arabic

**Species of Acacia tree (African continent).**

**PROPERTIES:**
- Moisture content 12-15%.
- Solubility in water about 40% at 24°C.
- Very high viscosity
- Max viscosity if the pH is adjusted to 6-7
- Used as lozenge/tablet, glaze

**Gum arabic** → don’t have special properties of the true gum.
- Gum arabic → relative high in cost → substitute with other gum.

**APPLICATION:**
- Glaze, binder for lozenges, gum candy, control crystallization.
Guar gum \(\rightarrow\) derived from the seed of the Guar plant \((Cyamopsis tetragonoloba)\) India.

- Chemically \(\rightarrow\) galactomannan with specific formulation.
- Extracted from endosperm (after remove outer husk and germ).

Carob gum \(\rightarrow\) Locust bean tree \((Ceratonia siligua)\) Mediterranean.

- Small yield = 3-4%
- Chem. Modif \(\rightarrow\) hydroxyethyl carboxyl esters \(\rightarrow\) improve solubility & viscosity
- Jelly candy \(\rightarrow\) add with 0.1-0.2\% \(\rightarrow\) prevent syneresis.
**STARCH FUNCTION**
- Dusting & molding medium
- Gelling ingredient to jellies+gum
- Thicken or contributes body product

**MODIFIED STARCH**
- To improve texture & decrease syneresis
- Example: corn flour, rice, potato & tapioca
Present naturally in fruits & vegetables.
- Gel forming agent
- High molecular weight polymer
- Solubility in syrup decrease → due to increasing of its concentration
- Stable in acid pH

Galactose → Galacturonic acid (pectic acids) → methyl Galacturonic (Pectin’s monomer) → Pectinic acid (polymethylgalacturonic)
PECTIN’S TYPE

High methoxyl pectins
- 50% or >>> the carboylic group esterified
- Jellification → Need the presence of soluble solid (sugar) 60-80% and acid (pH 3.1-3.6) to form gels.
- Jelly candy → min. soluble solids 75%

Low methoxyl pectins
- <<< than 50%
- Require metallic salt to form gel, usually calcium.
- Useful in prep. Of puddings and sauces.

The relationship between gel formation, pH and soluble solids content ????
5. ANTIOXIDANT

- **DEFINITION**
  → Molecule capable of slowing or preventing the *oxidation* of other molecules.

- **OXIDATION** → a chemical reaction that transfers electrons from a substance to an *oxidizing agent*.

- **OXIDATION** → produce *free radicals*, which start chain reactions that damage cells.

- **ANTIOXIDANTS** terminate these chain reactions by removing free radical intermediates, and inhibit other oxidation reactions by being oxidized themselves.
Antioxidants are often reducing agents such as:

1) Thiols
2) Ascorbic acid or polyphenols.

- **WATER SOLUBLE**
  - Ascorbic acid, glutathione, lipoic acid, uric acid

- **LIPID SOLUBLE**
  - Carotenes, ubiquinol, tocopherol
**TYPE:**
- Propyl Gallate
- BHA
- BHT

**FUNCTION:**
- Inhibit oxidative breakdown of fat = extending shelf life candy
6. SAA

- **DEFINITION**
  - Substance which lowers the surface tension of the medium in which it is dissolved, and/or the interfacial tension with other phases, and, accordingly, is positively adsorbed at the liquid/vapour and/or at other interfaces.

- **TYPE**: Glycerol monoesters, sorbitan.

- **FUNCTION**: inhibit or prevent blooming, stabilize the emulsion system.
- **GLYSEROL MONOESTER**
  - Frequently used in gummy candies
  - Reduce adhesiveness
  - Inhibit candy adhering (on teeth)

- **SORBITAN MONOESTER**
  - Ester of fatty acids and sorbitan
  - Prevent bloom in confectionery product
  - Improve palatability
AERATING AGENTS

- **DEFINITION**
  - Method of introduction of air or other gas in the form of very small bubbles, into a liquid or solid products.

- **Example:**
  - whole egg, egg albumen, egg white, gelatin.

EFFECTS OF AERATING AGENTS:
- Density reduction
- Texture modification
- Special Mouthfeel
- Change in shelf life

CAN BE APPLIED IN:
- Marshmallow, aerated chocolate, chewable candy
Influence texture of candy
Aerating agent (stabilizing dispersed air cell in whipped candy)

- Water & syrup soluble
- **Whipping & foaming abilities** (in boiling syrup)
- Candy using soy albumen has darkness **colour** than using egg albumen
- **Moisture retaining** capability
GELATIN

- Product obtained by partial hydrolysis of collagen derived from the skin, white connective tissue and bones of animal (cattle).
- **Application**: ice cream, pie fillings.
- Generally used ranging from 1.5-2.5% concentration in marshmallow

**Type:**
- **Type A**: derived from acid treatment, isoelectric point pH 7 and pH 9.
- **Type B**: derived from alkali treatment, isoelectric point pH 4.7 and pH 4.5.
- It swell when soaked in cold water → dissolve on heating.
- sheet, flake, powder, colorless, smell
7. ANTIMIKROBIA

KARAKTERISTIK:
- Efektif menghambat pertumbuhan m.o. dalam jumlah kecil
- Memperpanjang umur simpan produk pangan

TIPE / JENIS:
- Sulfit
- Sulfurdioksida
- Garam nitrit
- Asam sorbat
- Asam organik (propionat, asetat)
- Asam benzoat
- Antibiotika
- Bakteriosin
**SULFIT**

**KARAKTERISTIK :**
- Asam bersulfur (ion HSO₃⁻) menghambat pertumbuhan m.o.
- HSO₃⁻ pada pH tinggi menghambat bakteri
- Pada pH rendah → menghambat khamir, kapang

**MEKANISME :**
- Bisulfit + asetaldehida (dalam sel) → mengganggu sistem respirasi sel → sel terhambat pertumbuhannya
SORBAT

JENIS:
- Asam sorbat
- Natrium sorbat
- Kalium sorbat

KARAKTERISTIK:
- Menghambat kapang dan khamir
- Aplikasi pada roti, jus buah, wine, pickle
- Konsentrasi 0,3 % efektif menghambat kapang
- Kapang tidak bisa memetabolisme asam lemak alifatik tak jenuh (alfa diena)
ASAM ORGANIK

Propionat :
- Na-propionat atau Ca-propionat
- Menghambat kapang dan bakteri
- Efektif menghambat kapang (0,3% b/v)
- Aplikasi: roti

Asetat :
- Na-, K- dan Ca-asetat
- Menghambat kapang (0,1-0,4%)
- Tidak efektif menghambat khamir
- Aplikasi: daging, roti
ANTIMIKROBA

Benzoat :
- Aplikasi : produk asam (jus buah, minuman karbonasi, pickle)
- Konsentrasi 0,05-0,1%
- Efektif menghambat khamir dan bakteri.

Antibiotika :
- Diproduksi oleh m.o.
- Nisin, klortetrasiklin, oksitetrasiklin
- Aplikasi pada karkas daging
- Nisin efektif menghambat bakteri Gram (+)
8. CHELATOR

- Mampu berikatan dengan logam → Membentuk kompleks

JENIS :
- asam karboksilat (sitrat, malat, tartarat, oksalat, suksinat)
- asam polifosfat
- EDTA

Ion logam menyebabkan :
- Perubahan warna / diskolorisasi
- Ketengikan
- Kekeruhan
- Perubahan cita rasa
Chelator mampu membentuk kompleks dengan logam Cu, Zn, Mn (pada enzim), Fe (pada protein)
EDTA (500 ppm) → digunakan untuk produk emulsi, ex : mayonaise

EDTA (etilen diamin tetra asetat) mengkelat Fe,Cu dan Zn.
Logam tsb bereaksi dengan sulfida pada seafood → warna hitam → daya tarik konsumen rendah
Ethylenediaminetetraacetic acid (EDTA) chelates a metal ion.
9. ANTICAKING

TUJUAN:
- Mencegah penggumpalan pada produk serbuk
- Menjaga free flowing produk
- Menyerap kelebihan air
- Mencegah aglomerasi

JENIS:
- Kalsium silikat
- Na-silikoaluminat
- Mg-silikat, Mg-karbonat

APLIKASI:
- Tepung terigu
- Baking powder (kons. Silikat 5%)
- Garam dapur (kons. Silikat 2%)
10. FIRMING AGENT

BAHAN :
- Garam kalsium konsentrasi 0,1-0,25%
- Kalsium klorida (CaCl2)
- Kalsium sitrat
- Kalsium sulfat
- Kalsium laktat
- Monokalsium fosfat

TUJUAN :
- Meningkatkan kekerasan jaringan
- Meningkatkan pembentukan Ca-pektat dan Ca-pektinat
- Kompleks ini → menghasilkan tekstur keras
APLIKASI FIRMING AGENT

Buah dan sayuran :
- Buah kaleng
- Sayuran kaleng
- Manisan buah

Kapur Sirih
11. PENJERNIH

PENYEBAB KEKERUHAN:
1. Senyawa fenol:
   - Antosianin
   - Flavonoid
   - Tanin
2. Protein, pektin → membentuk koloid

BAHAN PENJERNIH:
- Bentonit
- Zeolit
- Gelatin
- Resin sintetis

APLIKASI:
- Produk bir
- Produk wine
- Jus buah
CLARIFYING AGENT

ZEOLIT

Bentonit
12. PEMUTIH

BAHAN PEMUTIH :
- Benzoil peroksida (0,025-0,075%)
- Klorin dioksida
- Nitrosil klorida
- Nitrogen oksida

BAHAN PENGOKSIDASI :
- Kalium iodat
- Kalium bromat
- Kalsium iodat

APLIKASI :
- Produk tepung terigu
- Terigu segar \(\rightarrow\) warna kuning pucat, produk roti lengket
- Terigu hasil aging \(\rightarrow\) warna putih, roti mengembang
- Bahan pengoksidasi (konsentrasi 10-40 ppm) \(\rightarrow\) perbaikan adonan roti
13. HUMECTANT

CHARACTERISTICS:

- Bind free water
- Reduce Aw
- 15-30% water content
- 0.7-0.85 Aw

TYPE:

- Glycerol
- Sucrose
- Glucose
- Propylene glycol
- Salt
- Waxes
- Coconut
Bodying/bulking agent
Soft center
Sanding
Generally use as toasted form, sweetened or unsweetened
Desiccated coconut with different kind of size
Waxes

- As glazes applied in the chocolate of sugar panning process
- Ex: bees wax, carnauba wax
- **FUNCTION**: provide protection from cracking & splitting, moisture loss
14. IMPROVER

TUJUAN:

- Melepaskan karbondioksida pada adonan
- Mengembangkan adonan saat pemanggangan

Bahan pengembang:

- Garam bikarbonat:
  - Natrium bikarbonat
  - Amonium bikarbonat
  - Kalium bikarbonat

APLIKASI:

Cookies, roti
PENGEMBANG ASAM

CONTOH :

- Kalium asam tartarat
- Natrium aluminium sulfat
- Glukono lakton
- Ortoo, pirofosfat
- Baking powder: campuran improver dengan pengembang asam, pati