T.o.p.i.c 2

FOOD INGREDIENTS, ADDITIVES, & PROCESSING AIDS

This topic covers the definition, function and application of food additives and processing aids, as well as E-number and INS for food additives

LESSON OUTCOMES (LO)

Upon completion of this lesson, students should be able to:

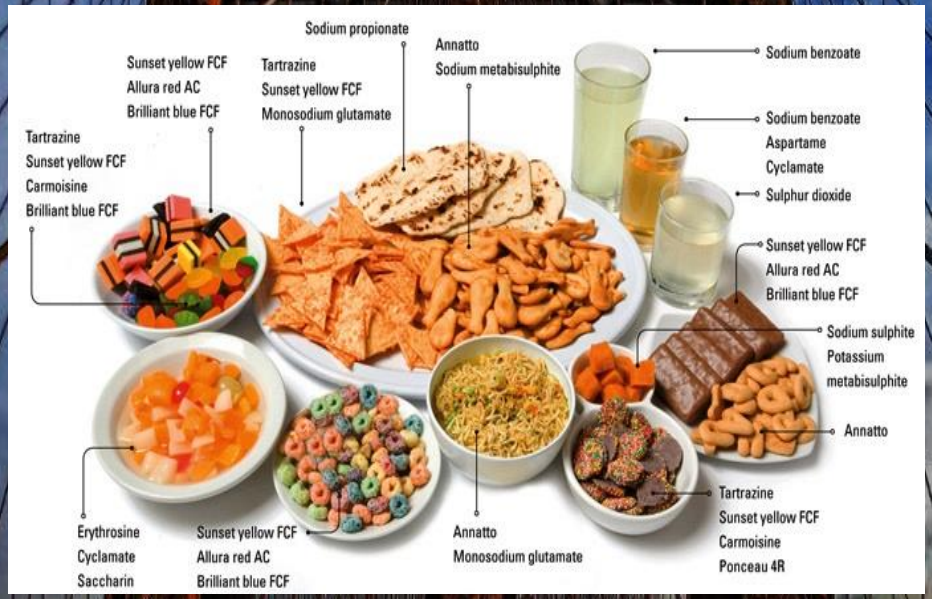
2.1 explain the function and application of food ingedients and additives

2.2 describe the function and application of processing aids

2.3 explain E-numbers & INS

2.1

Food Ingredients
Food Additives



DEFINITION

i. Food Ingredients

- An edible substance that forms part of a mixture (product)
- A food product is mandated to display a list of ingredients according to their relative weight
  (Food Reg. 1985, Part IV Reg 11(e))

(e) where the food consists of two or more ingredients, other than water, food additives and added nutrient, the appropriate designation of each of those ingredients in descending order of proportion by weight and, wherever required by these Regulations, a declaration of the proportion of such ingredient;

- Many commercial products contain a secret ingredient that is purported to make them better than competing products

ii. Food Additives

- A substance intentionally used in small quantities in order to:
  - affect food's quality
    - e.g: shelf life, appearance, taste, texture, odour
  - serve technological functions during production, transportation and storage
  - becomes part of the food ingredient

- It includes:

a. preservative
b. colouring substance
c. flavouring substance
d. flavour enhancer
e. antioxidant
f. food conditioner

Food Regulations 1985: Schedules

PRESERVATIVE, Colouring Substance, Flavouring Substance, Flavour Enhancer, Antioxidant, Food Conditioner

Functions:

- To prevent Avoid decomposition caused by the growth of microbes or unwanted chemical changes (excludes herbs, spices, vinegar and wood smoke)

Sources:

- Natural - eg: salt, sugar, vinegar, alcohol
- Chemicals - eg: sulfur dioxide, benzoic acid, sorbic acid, nitrite/nitrate

Uses:

- eg- salt(pickles), benzoic acid (soy sauce), nitrite (sausage)

Food Regulations 1985:
Sixth Schedule

[Am. PU (A) 162/88, 521/92, 123/95, 90/99, 131/02, 318/12]

SIXTH SCHEDULE

(Regulation 20)

PERMITTED PRESERVATIVE THAT MAY BE ADDED TO SPECIFIED FOOD AND THE MAXIMUM PERMITTED PROPORTION IN EACH CASE

TABLE I

(1) *Food*	PRESERVATIVE [Maximum permitted proportion in milligram per kilogram (mg/kg)]		
	(2) *Sulphur Dioxide (or sulphites calculated as sulphur dioxide)*	*(3)* *Benzoic acid (or sodium benzoate calculated as benzoic acid)*	*(4)* *Sorbic acid (or its sodium, calcium or potassium salts calculated as sorbic acid)*
Cheese, processed cheese, cheese paste and dried cheese	Nil	Nil	1,000
Chilli slurry … … … … … … … … … …	Nil	1,000	Nil
Cider … … … … … … … … … … …	200	Nil	Nil
Curry paste … … … … … … … … … …	Nil	350	Nil
Coconut milk	Nil	1000	Nil
Dextrose anhydrous and dextrose monohydrates	20	Nil	Nil
Edible gelatin … … … … … … … … … …	1,000	Nil	Nil
Essence and flavouring emulsion … … … …	800	350	800
Fermented soya bean product … … … … …	Nil	1,000	Nil
Fish paste, belacan, cincalok, otak udang, pekasam, fish ball and fish cake	Nil	750	Nil
Flavoured drink concentrate requiring more than 50 times dilution and the addition of sugar	Nil	*2,000	Nil

Food company fined for its noodles using banned acid

Jan 26, 2018

KUALA LUMPUR: A food manufacturing company was fined RM10,000 by a magistrate's court here for selling noodles containing benzoic acid, a prohibited food preservative.

EHH Food Industry Sdn Bhd operations supervisor Oh Ching Hai pleaded guilty to selling "Laksa Pendek" (Loh Shi Fun) at a supermarket in Kepong at about 10am on Aug 22 last year.

The company had committed an offence under Section 13B(1) read together with Section 13B(2)(d) of the Food Act 1983, as the addition of benzoic acid into the product is prohibited under the Food Regulations 1985 law.

The maximum sentence provided for under the Act is a RM20,000 fine or five years in jail.

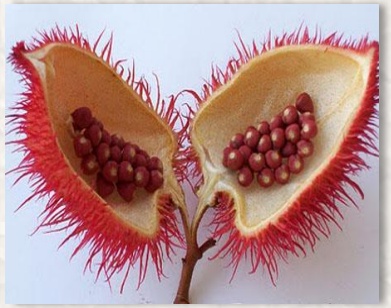
Preservative, **COLOURING SUBSTANCE**, Flavouring Substance, Flavour Enhancer, Antioxidant, Food Conditioner

Function:

- imparts colour to food (including ingredients used during the preparation of colouring materials)

Source:

- Natural – e.g. carmine (cochineal), caramel, annatto, carotene, chlorophyll, saffron, turmeric, beta-carotene
- Synthetic – e.g. sunset yellow, tartrazine, amaranth



Uses:

- e.g - Turmeric (cooking oils), Caramel (soy sauce), carmine (candies), Sunset yellow (soft drinks), Tartrazine (puddings)

Food Regulations 1985: Seventh Schedule

Preservative, Colouring Substance, **FLAVOURING SUBSTANCE**, Flavour Enhancer, Antioxidant, Food Conditioner

Function:

- imparts flavour/aroma to food
  - except cade oil, cocaine, nitrobenzene and harmful flavoring compounds

Sources:

- Plants – e.g. spices, herbs, fruit/vegetable juices, eggs, vanilla
- Animals – e.g. animal oil as the basic ingredient of smoke flavouring; castoreum as a flavor of vanilla, strawberry, raspberry



- Synthetic,.e.g.:

Chemical	Flavour
Allylpyrazine	Roasted nut
Methoxypyrazines	Earthy vegetables
2-Isobutyl-3 Methoxypyrazine	Green pepper
Acetyl-L-Pyrazines	Popcorn
2-Acetoxy Pyrazine	Toasted flavours
Aldehydes	Fruity, green
Alcohols	Bitter, medicinal
Esters	Fruity
Ketones	Butter, caramel
Pyrazines	Brown, burnt, caramel
Phenolics	Medicinal, smokey
Terpenoids	Citrus, piney

Chemical	Odor
Diacetyl, Acetylpropionyl, Acetoin	Buttery
Isoamyl acetate	Banana
Benzaldehyde	Bitter almond, Cherry
Cinnamaldehyde	Cinnamon
Ethyl propionate	Fruity
Methyl anthranilate	Grape
Limonene	Orange
Ethyl decadienoate	Pear
Allyl hexanoate	Pineapple
Ethyl maltol	Sugar, Cotton candy
Ethylvanillin	Vanilla
Methyl salicylate	Wintergreen

Uses:

- *(see above tables)*

Food Regulations 1985: Eighth Schedule

Preservative, Colouring Substance, Flavouring Substance, **FLAVOUR ENHANCER,** Antioxidant, Food Conditioner

Function:

- Enhance or improve the flavor of food
  - Includes monosodium salt of L-Glutamic acid (MSG, Monosodium L-Glutamate), sodium salt or calcium guanylic acid, yeast extract

Sources:

- MSG (cassava), guanylic acid (yeast or sardine extract)

Uses:

- wide range of products

Food Regulations 1985: Ninth Schedule

Preservative, Colouring Substance, Flavouring Substance, Flavour Enhancer, **ANTIOXIDANT,** Food Conditioner

Function:

- slows down or inhibits rust/damage due to oxidation

Sources:

- Natural – e.g. ascorbic acid, tocopherol
- Synthetic – e.g. BHA, BHT, TBHQ, propylgallate

Uses:

- eg: chocolate, nuts, snacks

Food Regulations 1985: Tenth Schedule

TENTH SCHEDULE
(Regulation 24)

[Am. PU (A) 521/92, 90/99, 131/02]

PERMITTED ANTIOXIDANT THAT MAY BE ADDED TO SPECIFIED FOOD AND THE MAXIMUM PERMITTED PROPORTION IN EACH CASE

TABLE I

	ANTIOXIDANT [Maximum permitted proportion in milligram per kilogram (mg/kg)]							
(1) Food	*(2) Propyl, octyl or dodecyl gallate or any mixture thereof*	*(3) Butylated hydroxy-anisole (BHA)*	*(4) Butylated hydroxyl-toulene (BHT)*	*(5) Any mixture of BHA and BHT*	*(6) Tertiary butyl-hydroquinone (TBHQ)*	*(7) Any mixture of gallates with BHA or BHT or BHT and/or TBHQ*	*(8) Isopropyl citrate or Monoisopropyl citrate*	*(9) Sodium erythrobate*
Chewing gum	Nil	200	200	200	Nil	Nil	Nil	Nil
Coconut cream, coconut cream powder and peanut butter	100	200	200	200	200	200	100	Nil
Edible oil and edible fat and ghee (on fat basis)	100	200	200	200	200	200 (gallates not to exceed 100 mg/kg)	100	Nil
Vitamin oil and concentrate	100	200	200	200	Nil	Nil	100	Nil
Partial glycerol ester	100	200	200	200	Nil	Nil	100	Nil
Essential oil including their flavouring constituent isolate and concentrate	100	200	200	200	Nil	Nil	100	Nil

Preservative, Colouring Substance, Flavouring Substance, Flavour Enhancer, Antioxidant, **FOOD CONDITIONER**

- **Consist of:**
  - emulsifiers
  - antifoaming agents
  - stabilizers
  - thickeners
  - modified starches
  - gelling agents
  - acidity regulators
  - enzymes
  - solvents
  - glazing agents
  - anticaking agents

Food Regulations 1985: Eleventh Schedule

EMULSIFIERS, Antifoaming Agents, Stabilizers, Thickeners, Modified Starches, Gelling Agents, Acidity Regulators, Enzymes, Solvents, Glazing Agents, Anticaking Agents

Functions, e.g:

- Prevent water-oil separation
- Influence the formation of protein complexes, starches, surface active

Uses, e.g.:

- lecithin (chocolate), monoglycerides and diglycerides (ice cream, bread), glycerol monostrearate (cakes, biscuits)

Emulsifiers, **ANTIFOAMING AGENTS,** Stabilizers, Thickeners, Modified starches, Gelling agents, Acidity regulators, Enzymes, Solvents, Glazing agents, Anticaking agents

Functions, e.g.:

- Prevent bubble formation that could:
  - cause product defects or quality issues
  - Slow/stall processing times
  - prevent proper filling of containers
  - lead to equipment overflow
- avoid splashing water during frying

Uses, e.g.:

- silicone-based foam (pressing, mixing, filling of juices)
- polydimethylsiloxane (PDMS) to splashing of water during frying/cooking

Emulsifiers, Antifoaming agents, **STABILIZERS, THICKENERS, MODIFIED STARCHES, GELLING AGENTS,** Acidity regulators, Enzymes, Solvents, Glazing agents, Anticaking agents

Function:

- Increase the viscosity of liquids (without interfering with other properties)

Examples:

- Plants - Agar, CMC, xanthan gum, carrageenan, sorbitol
- Animals - gelatin

Emulsifiers, Antifoaming qgents, Stabilizers, Thickeners, Modified Starches, Gelling Agents, **ACIDITY REGULATORS**, Enzymes, Solvents, Glazing agents, Anticaking agents

Function:

- Regulate food pH and enzyme activity

Examples:

- Acetic acid (vinegar), citric acid, GDL (Glucono Delta-Lactone)

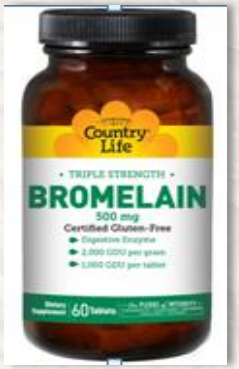
Emulsifiers, Antifoaming Agents, Stabilizers, Thickeners, Modified Starches, Gelling Agents, Acidity Regulators, **ENZYMES,** Solvents, Glazing agents, Anticaking agents

Function:

- Speed up biochemical reaction rate

Sources, e.g.:

- Plants - amylase, bromelain, papain,
- Animals - pepsin, rennet, lipase
- GMO-transglutaminase, alpha-amylase



Emulsifiers, Antifoaming Agents, Stabilizers, Thickeners, Modified starches, Gelling agents, Acidity regulators, Enzymes, **SOLVENTS,** Glazing agents, Anticaking agents

Functions, e.g.:

- Used in fats, oils, colours & flavours extraction
- Act as moistening agent
- Part of flavouring formulation

Uses, e.g .:

- ethanol (food colouring and flavouring)
- ethyl acetate (decaffeinated coffee/tea, confectionery)

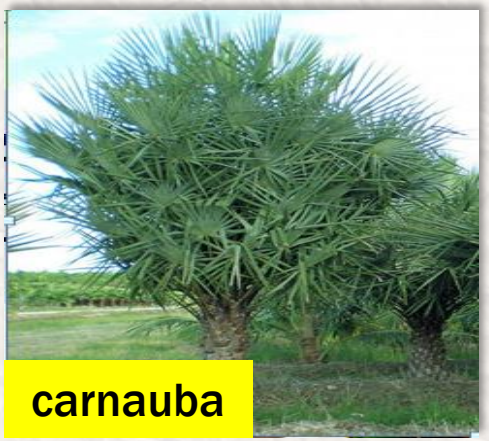
Emulsifiers, Antifoaming Agents, Stabilizers, Thickeners, Modified starches, Gelling agents, Acidity regulators, Enzymes, Solvents, **GLAZING AGENTS,** Anticaking agents

Function:

- To make the product shiny
- Act as a protective layer (coating) that extend shelf life

Sources, e.g.:

- Natural - beeswax, carnauba wax, candelilla wax, shellac
- Synthetic - paraffin wax


carnauba


candelilla

- *resin secreted by the female **lac bug**, processed and sold as dry flakes*
- *dissolved in **ethanol** to make liquid shellac*

Uses, e.g.:

- beeswax , Carnauba wax , candelilla wax (chocolate milk)
- Paraffin wax (chewing gum)

Emulsifiers, antifoaming agents, Stabilizers, Thickeners, Modified starches, Gelling agents, Acidity regulators, Enzymes, Solvents, Glazing agents, **ANTICAKING AGENTS**

Function:

- Prevent the formation of lumps (caking) and facilitates packaging, transportation and use

Sources:

- Natural, e.g. – corn starch, calcium carbonate, magnesium carbonate, silicon dioxide
- Synthetics, e.g. - aluminum silicate, calcium silicate, magnesium oxide

Uses, e.g.:

- Silicone dioxide (flour, sugar, baking powder)
- Calcium silicate (salt)

Commonly questionable ingredients/additives or processing aids

- **Gelatin**
  - protein from skin, tendons, ligaments, and/or bones of animals
  - usually obtained from pigs or cows, fish (and insects)
- **Enzymes**
  - derived from animals, plants or microbes, GMO
- **Glycerin, mono and di glycerides**
  - commercially obtained from pigs, cows , vegetables oil or fish oil
- **Whey**
  - a by-product of cheese industry that uses enzyme

- **Colouring agents**
  - derived from plants, insect, animals, minerals, chemicals
  - may content alcohol

Carmine/cochineal?

- Flavouring agents
  - derived from animals, plants, GMO
  - may contain alcohol
- Carboxylic acids (e.g: capric, myristic, oleic, palmitic, stearic, glutamic)
  - derived from animals, plants
- Minerals
  - derived from natural mineral, animal bones
- **L-cysteine (** bread improvers, dough conditioners/dough improvers)
  - may be obtained from poultry feathers or hog hair

- **Ruling on:**
  - blood plasma – haram
  - alcohol

For food products that have been added with food additives, the statement of the food additive must be stated as follows:

"contains permitted (specify the type of food additive concerned)"

e.g.: If a product contains the following additives:

Benzoic acid
Tetrazine
Pulegone
Butylated hydroxytoluene (BHT)

then the following statement should be stated:

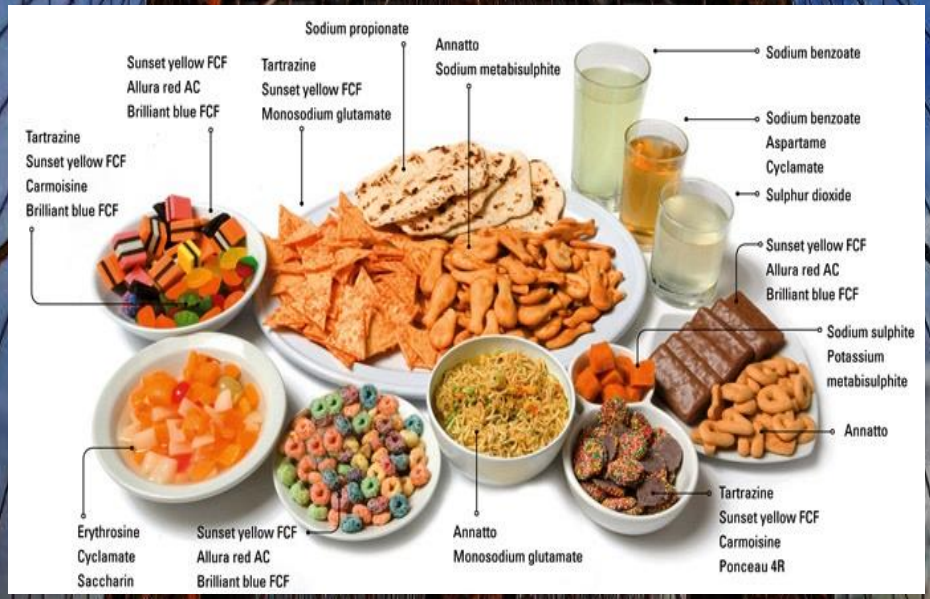
"Contains permitted food preservative, colour, flavour and antioxidant"

Ramuan: Gula, Sirap Glukosa, Minyak Isirung Kelapa Sawit Terhidrogen, Kopi Segera, Susu Tepung Skim (4%) [Susu Lembu], Natrium Kaseinat (Protein Susu), Garam. Mengandungi Penstabil, Pengemulsi Dan Agen Antipengerakan Sebagai Kondisioner Makanan *Yang* Dibenarkan. Aditif Makanan Adalah Daripada *Sumber* Tumbuhan Atau Sintetik.

RAMUAN: Daging ayam, kanji makanan, protein kacang soya, garam, rempah ratus dan natrium nitrit. Mengandungi kondisioner makanan dan perisa makanan yang dibenarkan.

2.2

Food Processing Aids



Processing Aids

- There is no regulatory definition of food processing aid in Malaysia.
- **Codex Alimentarius Commission** CAC/GL 75-2010
  - A substance/material apart from apparatus/utensils and not consumed as a food ingredient by itself that is intentionally used to serve technological functions during processing
    - may presence (residue) in the final product
  - The residues should not
    - perform a technological function in the final product.
    - pose any health risk (safe and insignificant levels)
  - Substance used should be of food grade quality

- It can include everything from food contact lubricants used on equipment to antimicrobials used in the final wash of produce
- Some substances can act both as additives and processing aids, e.g.: enzymes, foaming agents, pH regulators, anti-caking agents
  - enzyme in cheese making (additive)
  - enzyme in juice clarification (processing aid)

- It is important to check processing aids to determine their halal statuses

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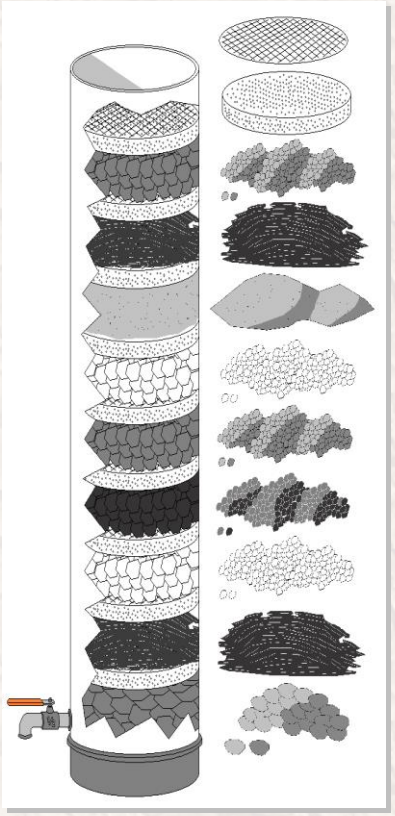
- *The Codex Alimentarius is a collection of internationally recognized standards, codes of practice, guidelines, and other recommendations relating to food*
- *Codex Contact Point, CCP (MOH) represents Malaysia's interests*

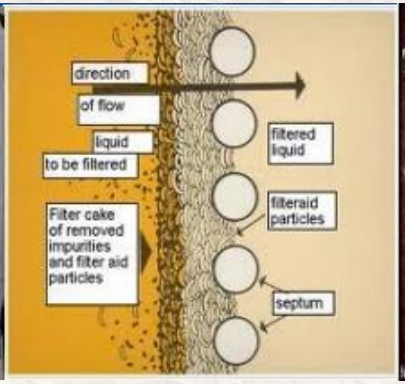
Types of Processing Aids, e.g.:

- clarifying/filtering agents
- bleaching agents
- fruit/vegetable waxes
- demoulding agents
- Anti-crystallizing agents
- washing agents and peeling agents
- biocides

CLARIFIYING/FILTERING AGENTS

- Used to eliminate dissolved/suspended substances that cause disorders (i.e. odour, colour, taste)
- Applications, e.g: drinking water, fruit and vegetable juices, fermented beverages
- e.g; clay, activated carbon, synthetic macromolecules





BLEACHING AGENTS

- Used to remove the color pigments
- Applications, e.g: widely used in various flour industry
- e.g: benzoyl peroxide, calcium peroxide, nitrogen dioxide, chlorine

FRUIT/VEGGIE WAX

- Used to prevent water loss and thus retard shrinkage and spoilage, and to improve appearance
- e.g.:
  - natural waxes –sugar-cane, carnauba, shellac, resin (tree)
  - synthetic – petroleum-based

DEMOULDING AGENTS

- Used to prevent the food preparation adheres to its support and facilitate its removal.
- e.g.: oils, petroleum jelly and paraffin used in many preparations such as pastry and confectionery.

ANTI-CRYSTALLIZING AGENTS

- Used to depress the formation of crystals where crystallization may slowdown process
- commonly used to prevent the formation of crystals (cloudy) palm olein stored at low temperature – cloud point of 10 C
- e.g; sorbitol, maltitol, maltodextrin

WASHING AGENTS AND PEELING AGENTS

- Used to clean and remove the skin of foods such as fruits and vegetables, fish and fishery products, meat and poultry, etc.

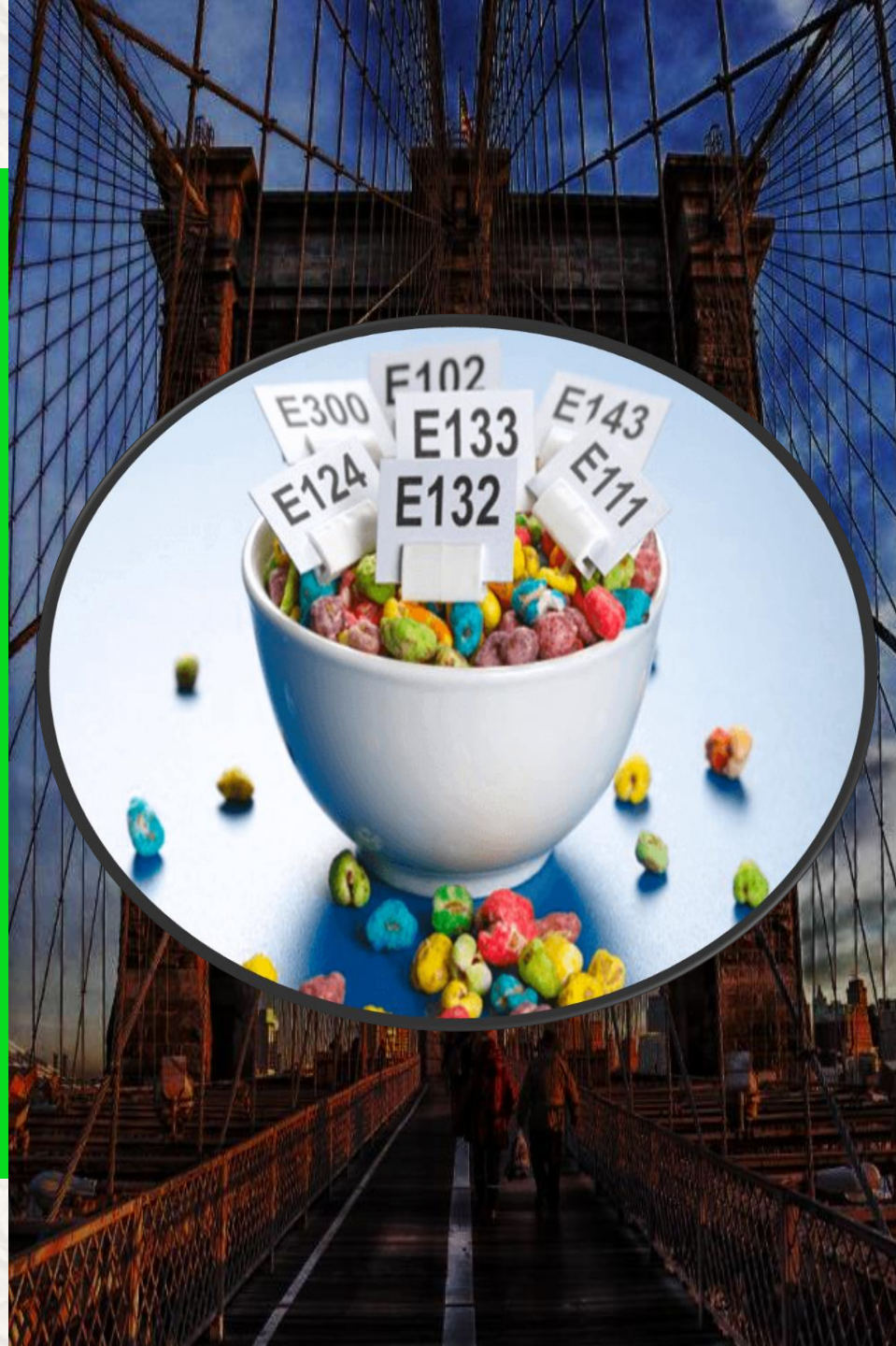
- e.g: acetic acid, citric acid, lactic acid, carboxymethylcellulose, alkylbenzene sulfonate

BIOCIDES

- Used to destroy microbes that may affect food quality or pose risk to human health
- e.g.: hydrogen peroxide, sodium hypochlorite, chlorine, formaldehyde, ozone
- Uses, e.g.:
  - preparation of products such as meats, fruits and vegetables and meat
  - control bacteria in chill water

2.3

E -numbers
INS



E Numbers

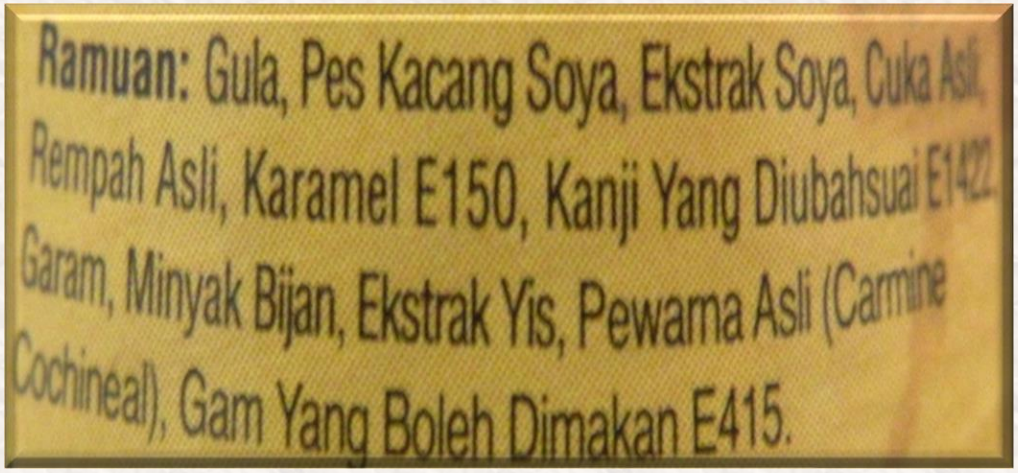
- The "E" stands for "Europe“
- Codes for food additives for use within the European Union (EU) and Switzerland.
- Their safety assessment and approval are the responsibility of the European Food Safety Authority

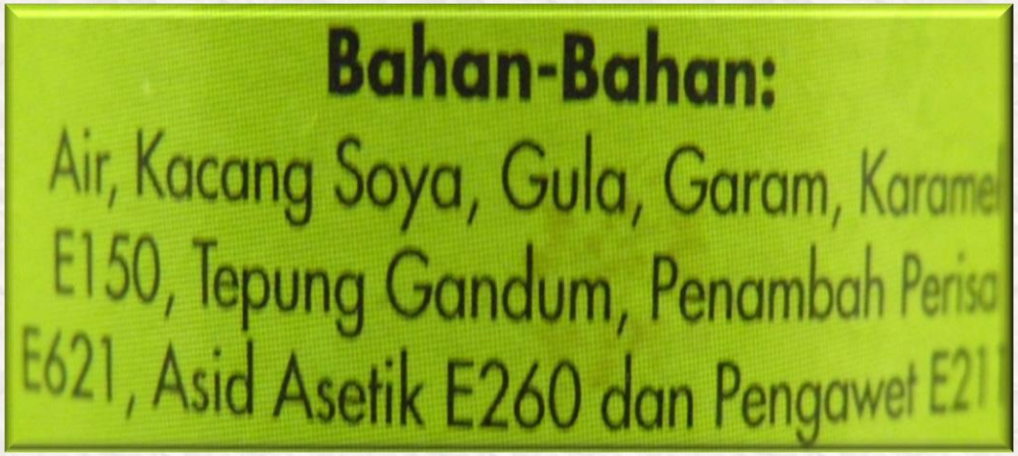
E Number

E100-E199	Colours
E200-E299	Preservatives
E300-E399	Antioxidants, Acidity Regulators
E400-E499	Thickeners, Stabilizers, Emulsifiers
E500-E599	Acidity Regulators, Anticaking Agents
E600-E699	Flavour Enhancers
E700-E799	Antibiotics
E900-E999	Glazing Agents and Sweeteners
E1000-E1599	Additional Chemicals

https://en.wikipedia.org/wiki/E_number

What are these Es stand for?





E150	Caramel
E1422	
E415	
E621	
E260	Acetic acid
E211	

INS (International Numbering System) for Food Additives

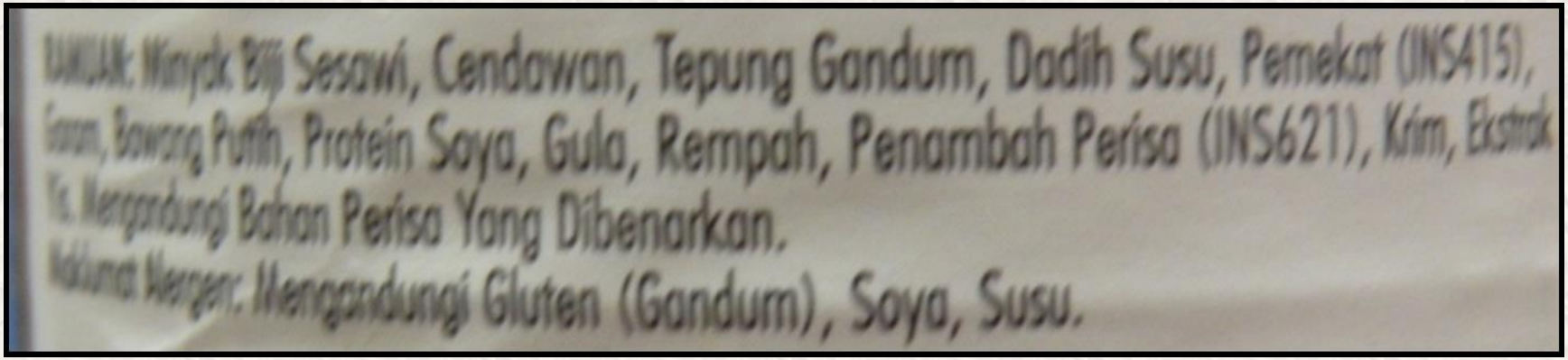
- European-based, agreed international numerical system for identifying food additives

- Prepared by:
  - Codex Alimentarius, the international food standards organisation of the World Health Organisation (WHO)
  - Food Agriculture Organization (FAO) of the United Nations (UN)

- consist of 3 or 4 digits, optionally followed by an alphabetical suffix
  - EU, approved food additives are written with a prefix of *E*
  - Australia and New Zealand do not use a prefix letter

- An additive that appears in the INS does not automatically have a corresponding E number
  - but generally correspond to E numbers for the same compound e.g. INS 102, Tartrazine, is also E102

What are these INS stand for?



INS#	*Approvals			Names	Type
	A	E	U		
INS415	A	E		Xantham gum	Thickener, Vegetable gum, stabilizer
INS621	A	E			

A- Australia & New Zealand
E- European Union (EU)
U- USA (*US does not use INS*)

LESSON OUTCOMES (LO)

Upon completion of this lesson, students should be able to:

2.1 explain the function and application of food ingedients and additives

2.2 describe the function and application of processing aids

2.3 explain E-numbers & INS