

Introduction to Food Science and Engineering

Classification of Food

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Classification of Foods

Foods can be classified into different classes:

- 1. on the basis of p^H ,**
- 2. on the basis of perishability,**
- 3. on the basis of energy, growth & disease control,**
- 4. on the basis of glycemic Index (GI),**
- 5. On the basis of ripening of fruits**

Classification of Foods

1. Classification on the basis of pH:

Food can be classified into 4 classes on the basis of p^H

1. **High acid foods:** $p^H < 3.7$; e.g. berries,
2. **Acid foods:** $p^H 3.7- 4.5$; e.g. tomato, pear, pineapple
3. **Medium acid foods:** $P^H 4.5 - 5.3$; e.g. beet, pumpkin, spinach
4. **Low acid foods:** $P^H 5.3 - 6.9$; e.g. corn, peas, beans, meat, fish, poultry and milk.

P^H is a numeric scale used to specify the acidity or basicity of an aqueous solution. it is the negative of the logarithm to base 10 of the activity of the hydrogen ion.

Solutions with a pH less than 7 are acidic and solutions with a pH greater than 7 are basic, and pH is neutral, neither acidic nor basic

Classification of Foods

2. Classification on the basis of perishability:

Food can be classified broadly into 3 groups based on their ease of spoilage:

- a. **Perishable foods:** Foods that spoil readily unless special preservative methods are adopted. Most of our daily foods belong to this group which include **meat, fish, poultry, milk, vegetables and fruits.**
- b. **Semi-perishable foods:** Foods that remain unspoiled for relatively long period under proper handling or storing conditions. These include **potatoes** and certain varieties of **apples.**
- c. **Nonperishable or stable foods:** Foods that do not spoil normally, such as **sugar, salt, flour** and **dry beans.** Improper handling or storing may, however, spoil them.

Classification of Foods

3. Classification on the basis of functions (e.g. energy, growth & disease control):

Foods may be classified into 3 groups on the basis of their **functions** to the body.

- a. Energy supply foods.** Foods that supply energy to the body such as **rice, wheat, corn, potato** etc. (Carbohydrate foods).
- b. Growth regulating foods:** Foods that regulate growth of the body such as **milk, meat, fish, egg** etc. (these are mainly Lipids and Protein foods).
- c. Disease protecting foods:** Foods that protect body from various diseases. Examples are **fruits** and **vegetables** (Vitamins and minerals foods)

Classification of Foods

4. Classification of food on the basis of glycemic index (GI):

Glycemic Index (GI):

The glycemic index is a value assigned to foods based on how slowly or how quickly those foods cause increases in **blood glucose levels**. Foods low on the glycemic index (GI) scale tend to release glucose slowly and steadily. Foods high on the glycemic index release glucose rapidly. Low GI foods tend to foster weight loss, while foods high on the GI scale help with energy recovery after exercise, or to offset hypo-(or insufficient) glycemia. Long-distance runners would tend to favor foods high on the glycemic index, while people with pre- or full-blown diabetes would need to concentrate on low GI foods.

Classification of Foods

Foods can be classified into 3 groups on the basis of GI:

Class	Range	Examples
Low GI	55 or less	Fructose, beans (black, pinto, kidney, peanut, chickpea); small seeds (sunflower, flax, pumpkin, poppy, sesame, hemp) walnuts, cashews, most whole grain (rice, millet, oats, barley) most vegetables, most sweet fruits (peaches, strawberries, mangos, mushrooms, chillis).
Medium GI	56-69	White sugar or sucrose, whole wheat, basmati rice, white rice, potato, grape juice, raisins, banana, ice cream,
High GI	70 or above	Glucose (100), (dextrose, grape sugar) High fructose corn syrup, white bread, most white rice, rice cake (82), corn flakes (81) , sweet potato (70), white potato (83), Baguette (white, plain) (95), water melon (72), pizza (80), Meshed potato 87, baked russet potato (111).

Glycemic Index

Low GI (<55), Medium GI (56-69) and High GI (70>)

Grains / Starchs		Vegetables		Fruits		Dairy		Proteins	
Rice Bran	27	Asparagus	15	Grapefruit	25	Low-Fat Yogurt	14	Peanuts	21
Bran Cereal	42	Broccoli	15	Apple	38	Plain Yogurt	14	Beans, Dried	40
Spaghetti	42	Celery	15	Peach	42	Whole Milk	27	Lentils	41
Corn, sweet	54	Cucumber	15	Orange	44	Soy Milk	30	Kidney Beans	41
Wild Rice	57	Lettuce	15	Grape	46	Fat-Free Milk	32	Split Peas	45
Sweet Potatoes	61	Peppers	15	Banana	54	Skim Milk	32	Lima Beans	46
White Rice	64	Spinach	15	Mango	56	Chocolate Milk	35	Chickpeas	47
Cous Cous	65	Tomatoes	15	Pineapple	66	Fruit Yogurt	36	Pinto Beans	55
Whole Wheat Bread	71	Chickpeas	33	Watermelon	72	Ice Cream	61	Black-Eyed Beans	59
Muesli	80								
Baked Potatoes	85								
Oatmeal	87								
Taco Shells	97								
White Bread	100								
Bagel, White	103								



Glycemic Load (GL)

Glycemic Load (GL):

- GL tells us how much glucose food will deliver to the blood stream instead of how slowly or how quickly it will increase the blood sugar. To understand a food's complete effect on blood sugar, it is necessary to know both how quickly and how much enter the bloodstream. The glycemic load is determined by multiplying the grams of a carbohydrate in a serving by the glycemic index, then dividing by 100.

- $$GL = \frac{\text{Weight in gm in one serving} \times GI}{100}$$

- A glycemic load of 10 or below is considered low;
- A glycemic load of 20 or above is considered high.
- Watermelon, for example, has a high glycemic index (80). But a serving of watermelon has so little carbohydrate (6 grams) that its glycemic load is only 5.

Classification of Fruits on Ripening

Ripening of fruits: Ripening occurs when enzymes such as **amylase** and **pectinase** break down **starches** and **pectin**, which softens and sweetens the fruit. Another factor that is essential in fruit ripening is ethylene (C_2H_4 or $H_2C=CH_2$), a naturally occurring gas that triggers and promotes the ripening process.

- 1. Climacteric fruits:** Which can ripen after being picked, produce much more ethylene than non-climacteric fruits. Examples are - Apple, banana, mango, papaya, pear, peach, apricot, plum, avocado, plantain, guava, nectarine, passion fruit, blueberry, cantaloupe. **praying ethylene before picking of fruits such as mangoes, melons, tomatoes and pineapples to obtain more uniform ripening. Carbon dioxide is an ethylene antagonist and retards ripening.**
- 2. Non-climacteric fruits:** which cannot ripen once removed from the plant, can not produce ethylene after being picked. Examples are - Citrus fruits such as grapefruit and lemon, berries such as raspberry, strawberry and cherry, grapes, pineapple, melon including watermelon, pomegranate.

Thanks