

assalamo alaikum sir .. im actually facing an issue in making notces of GSA

kindly please guide me how to make notice..

these notces that ive made it took me like 2 weeks to complete it. it shoud be lengthy or short at initial level?

or should i make it in word ? thank you

Biological Science

Neutrients

neutrients are the constituents of food which perform important functions in our body. If these neutrients are not present in our body in sufficient amount the result is ill health.

Important neutrients include:-

- ↳ Carbohydrates
- ↳ Lipids
- ↳ Vitamins
- ↳ Minerals
- ↳ Water

A neutrient is a substance used by an organism to survive, grow and reproduce.

Unbalanced diet

A diet that is not balanced that contains more carbohydrates, fats and less proteins.

- ↳ Artificially sweetened food
- ↳ increase intake of salt
- ↳ minimal intake of fruits, vegetables
- ↳ fish and whole grains

An unbalanced diet can either lead to malnutrition.

Malnutrition:-

The deficiency of proper nutrients in our body is called malnutrition.

Unbalanced diet leads to an malnutrition

Causes of Food deficiency:-

Wars

Famines

Internal displacement

poverty

Neglect

Ignorance

ability to metabolize and absorb nutrients

In Pakistan:

most common nutrition deficiencies are iron, calcium, zinc and vitamin A and D.

Cause:

- ↳ lack of nutritional awareness
- ↳ high population growth
- ↳ low purchasing power
- ↳ Price fluctuation
- ↳ Erratic food production
- ↳ inefficient marketing system.
- ↳ low healthcare and hygiene
- ↳ Inflation

How to plan a balanced diet:-

Diet depends on person to person.

For example; A young boy of 15 required more calories or energy than an adult man who does not do heavy work

Similarly lactating women require high energy and high protein diet for good lactation.

Food must
⑤ groups
Economic
in mind
makes bal
locally a

Food must be selected from all
⑤ groups

Economic status of person be kept
in mind. Food which is cheap
makes balanced food and is
locally available should be used.

Difference between Marasmus and Kwashiorkor:

Marasmus

Cause

Deficiency of both proteins
and calories.

Age Between the age of 6 months
and 1 year of age

Edema Absent

Weight loss There is severe weight loss

Symptoms There is only thinning of
limbs

Kwashiorkor:

Deficiency: Deficiency of protein

Age: Between the age of 6 months and (3) years

Edema: Present

weight loss: There is some degree of weight loss

Symptoms: There is thinning of muscles and limbs

Enzymes

biological polymers that catalyze biochemical reactions

Structure of enzymes:

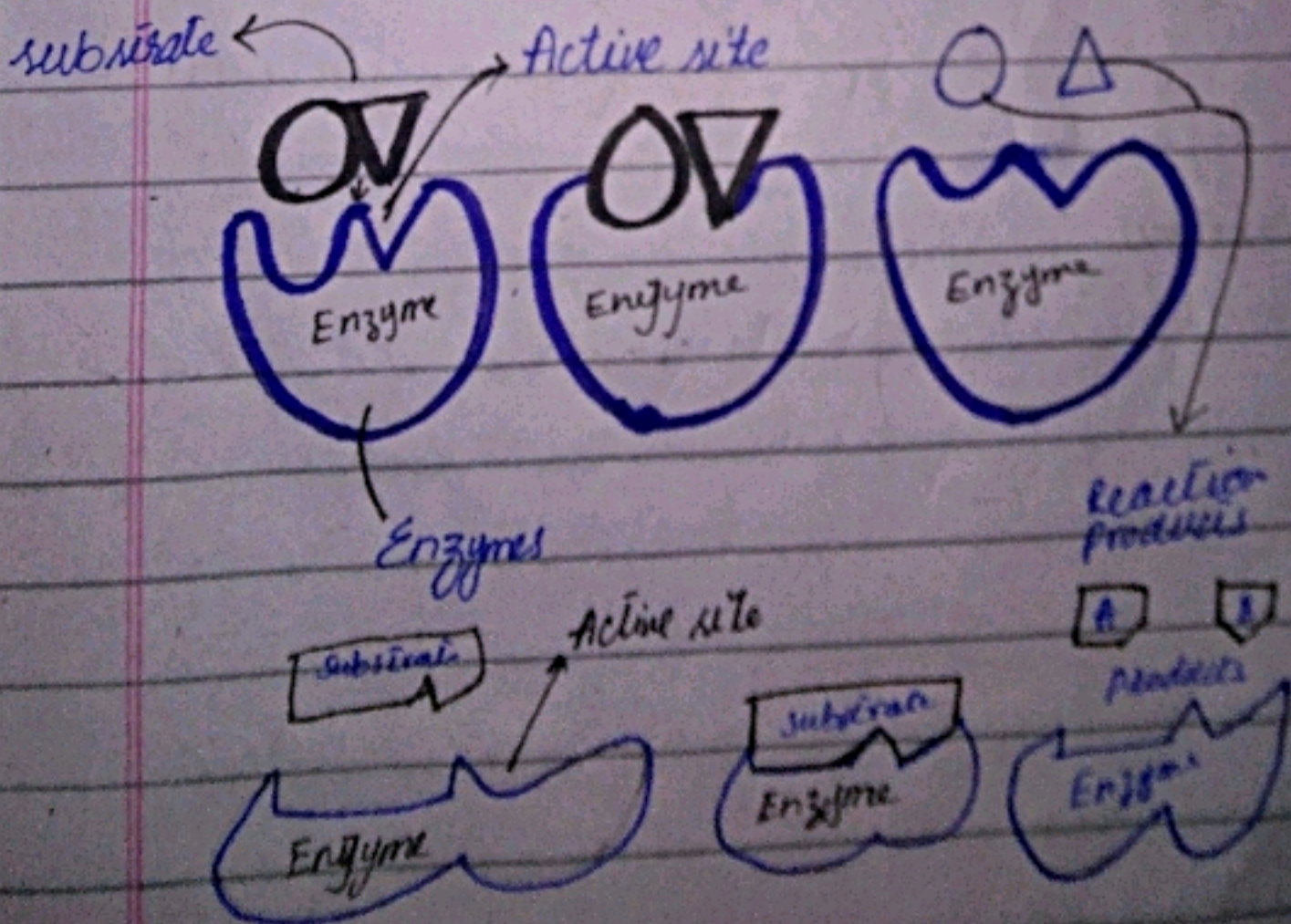
- ① highly selective
- ② catalyze specific reaction only

Active site

↳ have a part where only certain kind of substrate bind to it

Substrate:

molecule that react and bind to the enzyme



Isomerases:

causes geometric and structural changes in a substrate molecule

* Glucose to Fructose

* Galactose to Glucose

Ligases

synthesize the association of two molecules

EX DNA ligase catalyzes the joining of two fragments of DNA by forming a phosphodiester bond.

Properties and characteristics

They are always protein: protein in nature that's the reason protein is essential for health.

Specific in their action: substrate specific

Control one particular reaction \rightarrow pepsin only act on proteins

They can be used over and over again

their structure is not altered by the reaction

Destroyed by heat. Sensitive to temperature

Protein \rightarrow denatured by heat, most of \rightarrow stop working if the T rise 45°C . microbes have enzymes that can work on high temperature.

They are sensitive to pH

most intracellular work best in neutral condition

\rightarrow Enzymes in conditions in alkaline Basic pH increase \rightarrow million

Regulate high on Lock Site

90 \rightarrow would

Function

Kinase

of B

metab

1. Enzymes in stomach work best in acidic conditions
↳ small intestine work best in alkaline conditions.

Basic function:

increase the rate of a reaction

↳ million times faster than would be in absence

Regulate from a stage of low activity to high activity

Lock and key

Site specific like a key and lock

It is called lock and key model

↳ would only attach on a specific site

Functions of enzymes:

Signal transduction and cell regulation

Kinase and phosphatases help in this function

take part in bodily movement / help

of protein myosin which aid in muscle contraction

Breakdown of large molecules into absorbable

work together in an order forming

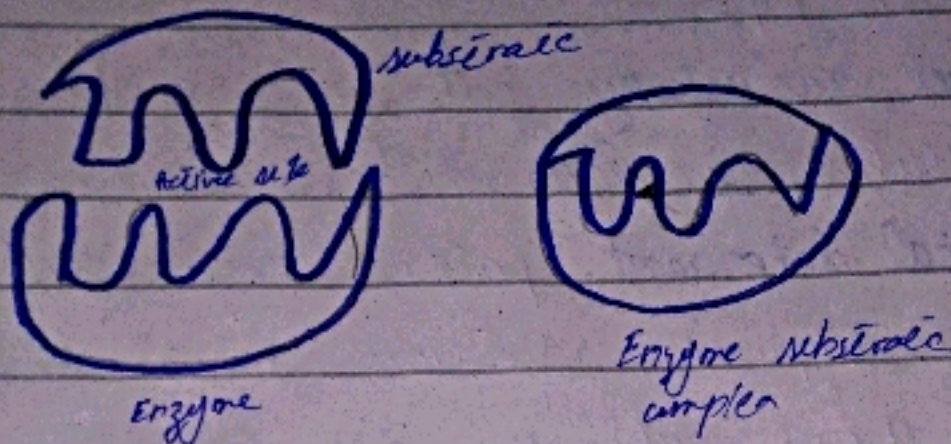
metabolic pathways.

glycolysis.

Lock and Key model

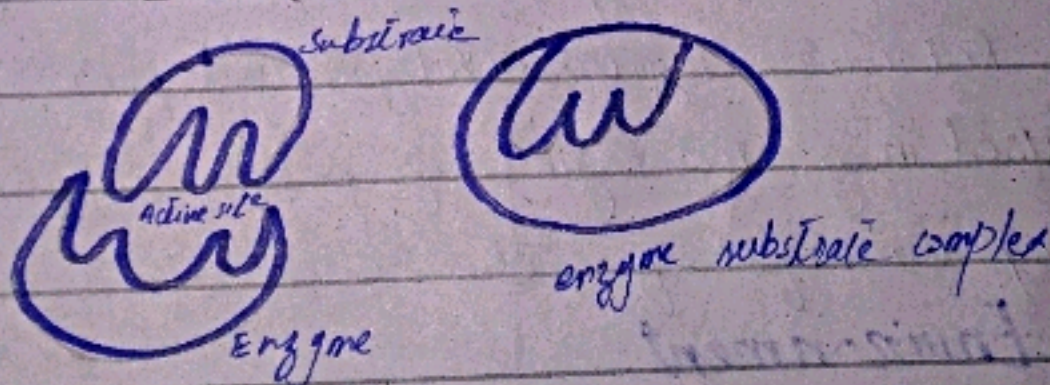
1894 Emil Fisher

enzyme and substrate possess complementary geometric shape → that fit exactly into one another.



Induced Fit model:

1958 Daniel Koshland



modification of lock and key model

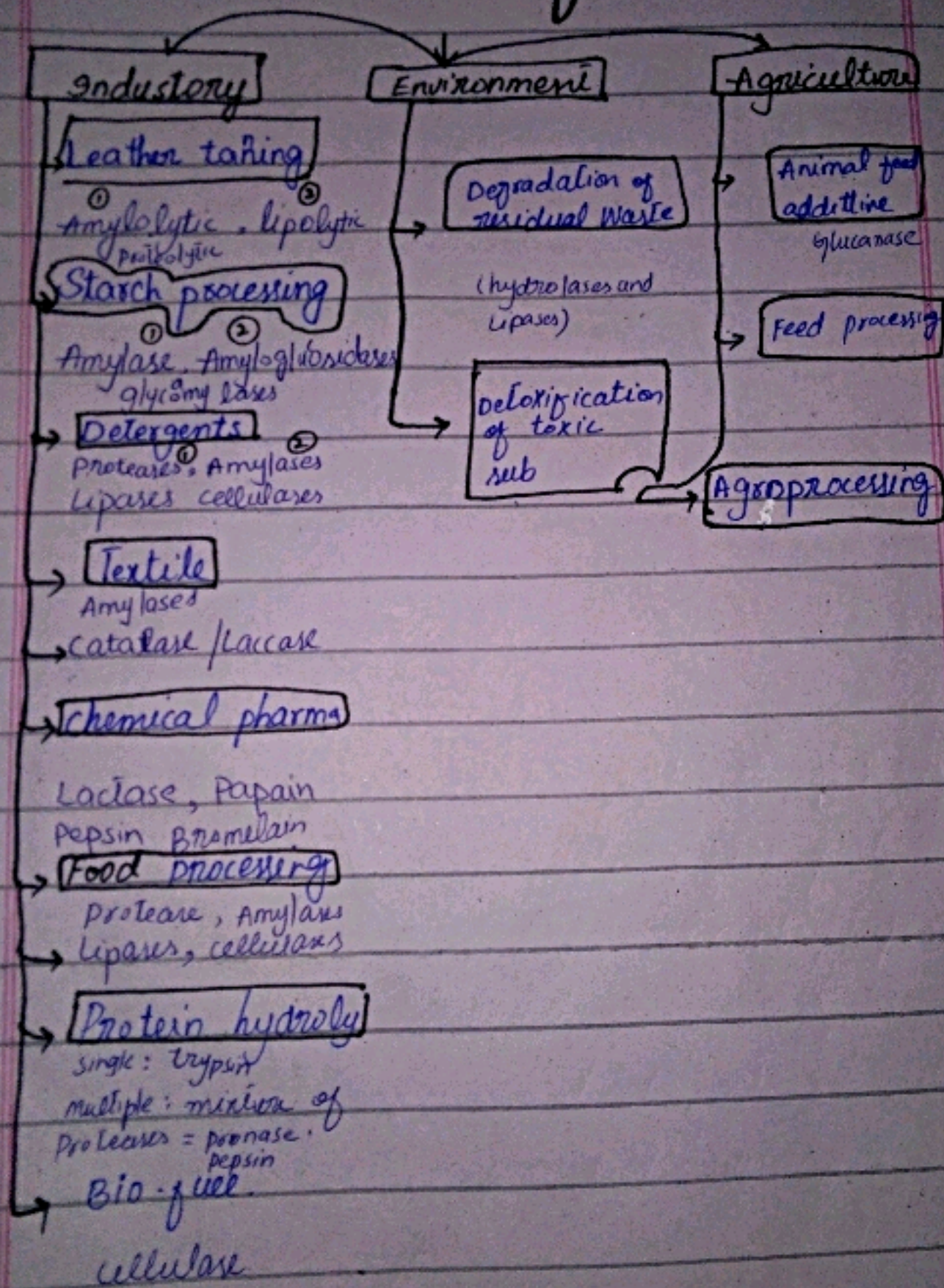
enzymes are rather flexible structure

active site continuously reshaped by interaction

with the substrate / as the substrate interacts with

the enzyme

Application of Enzymes



Vitamins

Define:

A vitamin is an organic molecule, an essential micronutrient that an organism needs in small quantities for the proper functioning of its metabolism.

- ↳ They cannot be synthesized by the body in adequate amounts.
- ↳ The body's requirement for vitamins may vary considerably, depending upon age, sex, physical activity, diet, metabolic rate, state of health, drug therapy, individual habits and other factors affecting vitamin absorption, utilization and excretion.

Vitamins deficiency or vitamins absence can lead to deficiency diseases.

Classification of Vitamins:-

Vitamins can be classified according to or on the basis of water or fat

soluble

Fat soluble

↳ dissolve easily in the water and in general, are readily excreted from the body

↳ They are excreted easily, they have to be replenished on regular, almost daily basis.

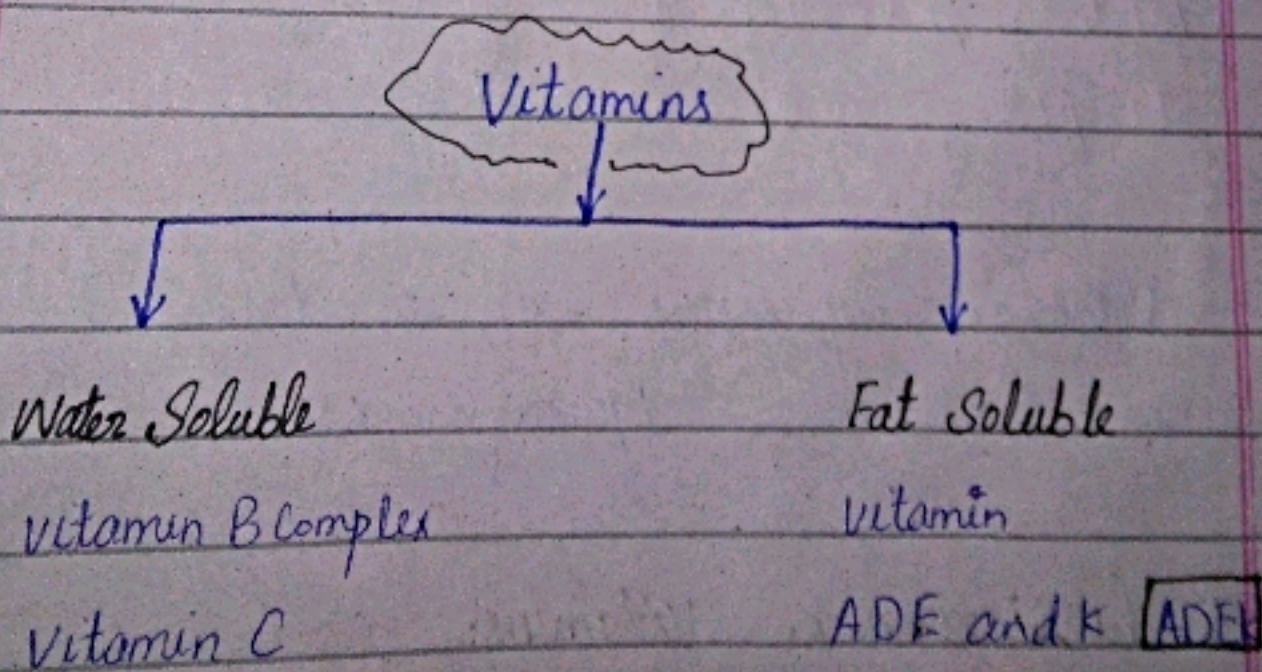
They do not cause toxicity

Water soluble

↳ Fat soluble vitamins are stored in the fats in human body.

↳ They are stored in fats, therefore, they are not readily excreted from body and are not taken in a controlled fashion.

They do cause toxicity



Fat s
Water soluble
↓

↳ vitamin B₁

Thiamine

↳ vitamin B₂

Riboflavin

↳ vitamin B₃

Niacin

↳ vitamin B₅

Pantothenic acid

↳ vitamin B₆

Pyridoxine

↳ vitamin B₇

Biotin

↳ vitamin B₉

Folate or Folic acid

↳ vitamin B₁₂

Cyanocobalamin

↳ vitamin C

Ascorbic Acid

Fat soluble
↓

↳ vitamin A

Retinal

↳ vitamin D (D₁ and D₂)

↳ Vitamin E

Tocopherol

↳ vitamin K

Menadiol

ADEFK

Trick to remember:

Tania Lania never play poor basket ball
for country.

Different types of Vitamins:-

Vitamins	Scientific name	Source	Function	Deficiency
↳ Vitamin A	Retinol	Carrot, green vegetables	healthy vision Boost immune system	Xerophthalmia night blindness
↳ Vitamin B	B-Complex	Animal and dairy products	DNA replication produce RBCs	muscle and body weakness
↳ Vitamin C	Ascorbic Acid	Citrus fruits Berries and Tomato	Antioxidant, Formation of collagen	Scurvy Anemia
↳ Vitamin D	Calciferol	Fish, egg yolk and cheese	Bone growth	Rickets Osteoporosis
↳ Vitamin E	Tocopherol	Almond, peanut and soybeans	Antioxidant Boost immune system	Neuropath Anemia
↳ Vitamin K	Phylloquinone	Green leafy vegetables	Blood Coagulation	Hemorrhagic disease

Lipids:

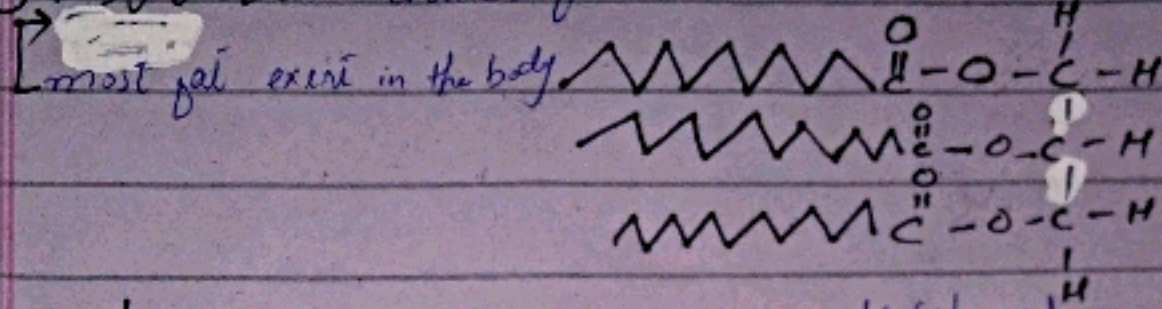
naturally → organic compounds → fats and oils

Contribute to cell structure + take part in biological process

Provides 9.1 calories energy per gram.

Basic Unit = Triglyceride: synthesised from Glycerol (propane-1,2,3 Triol) + fatty acid.

① Triglyceride - chemical form in which



② Phospholipids:

3 fatty acid + glycerol

found in membrane of animal + plants.

Contains: ① Glycerol + ② fatty acid

③ phosphoric acid + low molecular weight Alcohol

Lecithins

→ cephalins

Types:

Saturated

↳ solid fat
Present in Animal food mostly
↳ Cheese + milk + meat

↳ Also in Tropical oils =
Coconut + palm + Cocoa butter
healthy diet has lot.

* Can raise cholesterol

Trans fat

↳ This fat has been changed by process of hydrogenation → This process increase shelf life of fat, make it harder at room temperature

* Raise cholesterol present in processed food + snacks food + Cookies

Unsaturated fats

↳ Liquid at room temperature
↳ Oils from plants
* improve cholesterol level in the body

Types:

- ↳ Monounsaturated fat
- ↳ Polyunsaturated fat

monounsaturated fat

① Avocado, ② nuts, ③ vegetables oil
olive + peanut Lower "bad" LDL cholesterol

may also keep "good HDL" high

polyunsaturated fat

vegetable oil such as
① Safflower, ② sunflower + soybeans, ③ corn oil. main fat present in Seafood. Lower LDL
Omega 3, omega 6 fatty acids.

Food Additives:

Preservatives

↳ prevent or slows down the growth of bacteria or fungi so that food can be kept longer.

Sugar, salt, citric acid
sodium nitrite & benzoate

Flavouring Agents

Add taste or fragrant smells to make food more edible

Spices, nuts / oils, herbs

Stabilizers

↳ Mixes two liquids that usually do not mix together

↳ prevent the sedimentation process in liquids

↳ provide a smooth & uniform structure.

For EX

peitin and leuthin

Carrageenan

Antioxidants

↳ Slows down the oxidation of fat in food.

↳ prevents oil or fatty food from becoming rancid. vit A, C, E, lutein

Colouring Agents

Colours food to make it look more

attractive

Paprika, turmeric, saffron

iron and ~~iron~~ ^{iron} Colours

Thickening Agents

↳ Thickening liquids

such as soup and

sauces

Animal derived

Gelatin

Fermentation

product = Xanthan

Plant fragments = peitin

9.1 European Union:

all food additives are identified by an E number where E stands Europe.

Products labels must identify both the function of the additive in the finished food (colour preservatives) and the specific substances used either by referring to the appropriate E number or its name.

E 101 vitamin B₂ (Riboflavin)

Types on other basis:

↳ **Direct food additives** are usually added during processing of the food. To add nutrients, keep the products fresh or to make the food appealing. They may be man-made or natural.

↳ Herbs spices to increase in the flavour in the food.

↳ Vinegar for pickling foods ↳ Salt to preserve meat.

↳ **Indirect food additives** that may be found in the food during or after the food is processed.

They were not used or placed on purpose.

They become the part of food in trace amounts due to its packing, storage or other

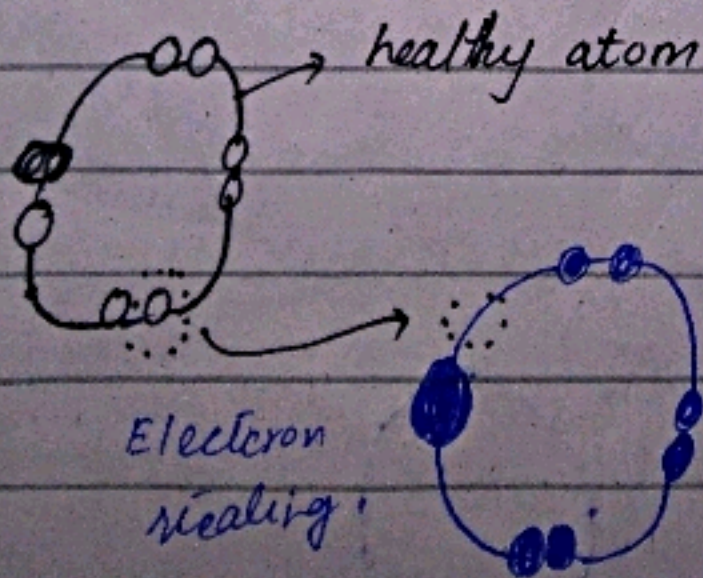
handling.

Quality of food

Anti oxidants:

A chain reaction that occurs in the presence of oxygen is responsible for the deterioration in the quality of food products including off-flavours and off-odors.

The cells in human body contain both positive and negative charges. The cell is neutral its charges are equally paired when they exposed to O₂ or they break down through a process called oxidation. When a substance oxidised if it gains oxygen loses hydrogen or lose electron charged particle is now left without pairs. They are free, known as free radicals.



problem arises.

When these free radicals try to achieve their old state of stability by converting other stable cells to free radicals. This kicks off a chain reaction that has the power to cause oxidative stress. Oxidative stress has been linked to critical diseases.

Conditions caused by free radicals:

↳ Deterioration of the eye lens which contribute to blindness.

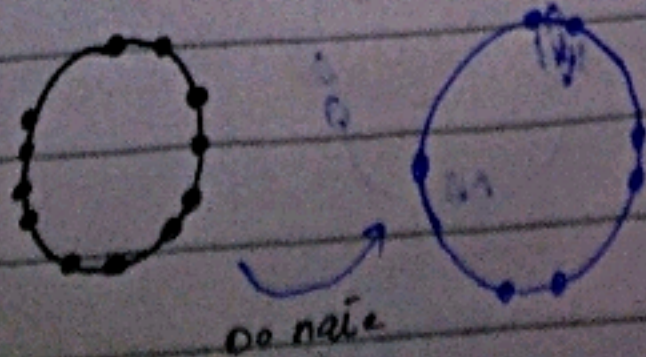
↳ Inflammation of the joints (arthritis)

↳ Damage to the nerve cells in the brain which contribute to conditions such as Parkinsons or Alzheimers disease.

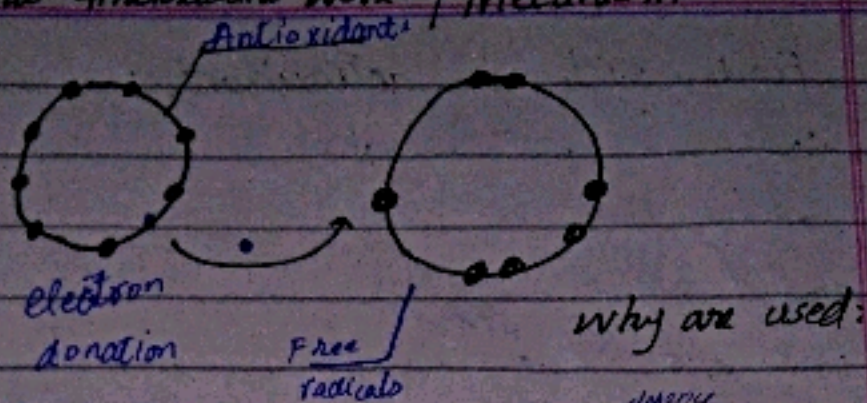
↳ Acceleration of the ageing process

↳ Increase risk of heart disease, since free radicals encourage low density lipoprotein (LDL) cholesterol to stick to artery walls.

↳ Certain cancers, triggered by damaged cell DNA



How do Antioxidant work: / mechanism



- ① Antioxidants are one of the ^{defense} ~~chief~~ mechanism used by the body to prevent free radical formation.
- ② They prevent and/or slowdown the damage by donating electron to these free radicals, in effect neutralizing the harmful chain reactions that free radicals can set off.
- ③ These substances are used to prevent oxidation of fats by molecular oxygen.
- ④ Without antioxidants potato, chips, breakfast cereals, salted nuts, fat containing dehydrated foods, crackers and many other fats-containing food (containing food) could not be stored very long without developing rancidity.

Synthetic Antioxidants:

- ↳ butylated hydroxy Anisole BHA
- ↳ Butylated ^{hydroxy} Toluene) butylated hydroxy toluene BHT
- ↳ Butylated hydroxy anisole BHA ↳ (Propyl gallate PG)
- ↳ Tertiary Butylated hydroquinone TBHQ

Natural

Foods rich in antioxidants:

- ↳ Grapes = Anthocyanins
- ↳ Blueberries
- ↳ Red berries
- ↳ nuts + milk = Copper = manganese
- ↳ Dark green vegetables green leaf vegetables = Siroinact + Lamin
↓
Lutein
- ↳ Tea Flavonoids - citrus fruit + onion + apple

Why are used in a food:

* Antioxidants have to be used in oils and fats to prevent rancidity. However, it occurs in insufficient quantities to prevent oxidative changes. BHA is widely used as an antioxidant in several edible oils, fats, butter, essential oils and vitamins oils.

* Some important antioxidants are used in foods are:

- i) Thiols
- ii) Ascorbic acid
- iii) Polyphenols
- iv) Vitamin A
- v) Vitamin E
- vi) Catalase
- vii) Superoxide dismutase
- viii) Various peroxides

Preservatives

A preservative is a naturally occurring or synthetically produced substance that is added to products such as foods, pharmaceuticals, paints, biological samples wood etc, to prevent decomposition by microbial growth or by undesirable chemical changes.

"Food preservation is any of a number of methods by which food is kept from spoilage after harvest or slaughter."

Oldest methods of preservation:

↳ Drying ↳ refrigeration ↳ fermentation

Modern methods:

↳ Canning ↳ pasteurisation ↳ freezing
↳ irradiation ↳ and ↳ the addition of
• chemicals

* Advances in packaging materials have played an important role in modern food preservation.

- most bacteria killed in the range $82-93^{\circ}\text{C}$
- many bacterial spores not destroyed even boiling at $100^{\circ}\text{C} \rightarrow 3 \text{ minutes}$

Sterility - total destruction of bacteria and spores \rightarrow Temperature of 121°C wet heat steam under pressure (as in laboratory Autoclave).

necessary to destroy only disease producing bacteria

Pasteurize milk

disease producing organisms in milk destroyed by pasteurization at 63°C 30 min. Harmful bacteria in milk that can lead to listeriosis, typhoid fever, tuberculosis etc

Cold:-

- \rightarrow Yeast, mold, bacteria grow $\rightarrow 10-38^{\circ}\text{C}$
- (Psychrotrophs \rightarrow grow down to 0°C freezing point of water)
- * Temperature below $10^{\circ}\text{C} \rightarrow$ growth become slower, or more slower the colder it gets
- * ⁹⁵ water in food completely frozen \rightarrow no multiplication of ^{micro}organisms

refrigeration and freezing preservation is the principal \leftarrow slowing of microbial activity with temperature

Drying:

microorganisms contain excess water 80%, get this water from food
⁹⁵ water is removed from the bacterial cell / multiplication stops
 is used as a food preservation technique since decades