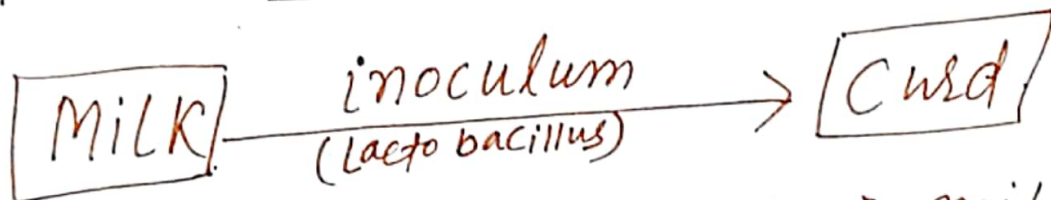


Microbes in Household products

- 1) curd
- 2) Dosa, idli
- 3) cheese.
- 4) Bread
- 5) Toddy.

#⇒ Lactic Acid Bacteria.



- Curd = Partial breakdown of milk.
- Add a vitamin → Vit B-12.
- Fight from infection in stomach.

#⇒ Any food that have pores present on their surface then we can say it is fermentated food.

- ~~From~~ From the pores CO_2 (Carbon di-oxide) release during processing.
- Fermented food is easily digesting food. & it is caused due to Yeast or Bacteria or fungus.

Bread.

Starch - Source like Wheat, Maize, Rice, Barley etc.

Convert into

Glucose

GLYCOLYSIS

Pyruvic Acid
↕
pyruvate.

Yeast - unicellular fungus.

Saccharomyces -
Cerevisias

or

Baker's Yeast

Anaerobic process through Yeast

Fermentation

$C_2H_5OH + CO_2$
ethanol

So $\Rightarrow$ Raising of dough.

$\Rightarrow$ IDLI & DOSA is fermented by
Bacteria. alone. [Lactobacillus]

$\Rightarrow$ Toddy - Palm Sap
(Taddi)
(fermentation)
Toddy
Initial stage: - Leuconostoc
- Leuco-Nostoc
- Hanseniaspora
Later stage: -
- Lactobacillus
- Gluconoacetobacter
- Saccharomyces

Cheese

- Cheese from access CO_2 Release is called Swiss cheese.
- Swiss - cheese is fermented by Bacteria Propionibacterium sharmanii.
- Roquefort cheese is ~~formed~~ by a type of cheese which is fermented by fungus → Penicillium Roqueforti.
- This fungus is ~~grow~~ for to increase its taste & flavour.

- ## # Microbes in Industrial Products
- ① Wine, Whiskey (Daaru) & Fermented Beverages
 - ② Antibiotics
 - ③ Chemicals, Bioactive Agents, Acids, Enzymes

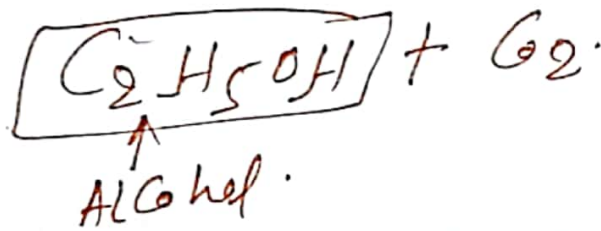
Fermented Beverages (Whisky/Wine)

From Any Source of Glucose like —
Wheat, Barley, Rice, Grapes, etc.

take Glucose.

Glucose

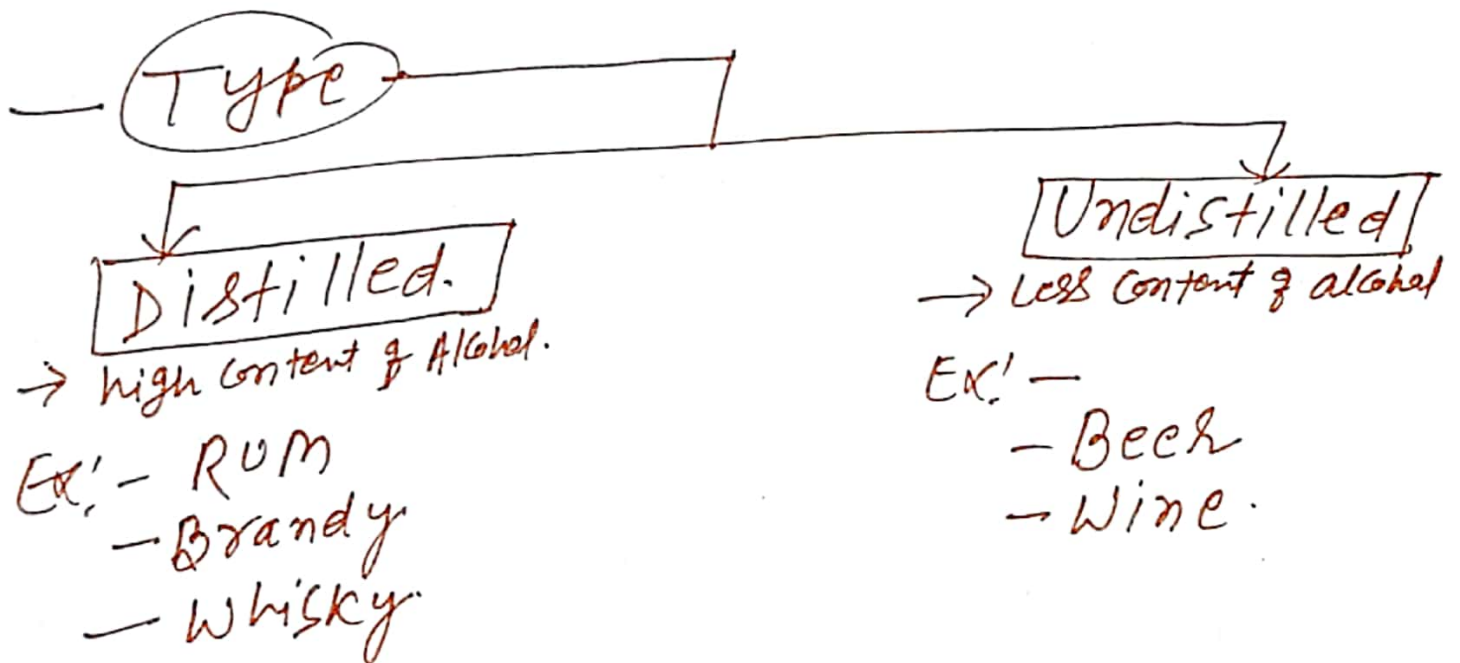
fermented with
Yeast (*Saccharomyces*
Cerevisias
or
Brewer's Yeast)



- In one cycle of fermentation maximum 13% Alcohol can be formed.
- More than 13% Alcohol is toxic for fermenting organism.
- If we need more than 13% Alcohol then we need to distill it again & again & we can increase the alcohol content.

Distillation.

- process of increasing alcohol content in a solution is called distillation.
- Distillation is done by cycling process of fermentation in which old yeast remove by filtration & introduce new yeast in the solution. again & again & then alcohol content increase as per our Requirement.



Antibiotics

- Antibiotics discovery was one of the best life saving discovery on this earth.
- Penicillin was the 1st Antibiotics which was discovered by chance.
- Any thing that is discovered by chance is called "Serendipity".

⇒ Discovery story.

- Alexander Fleming was a Scientist who was working ~~for~~ ^{on} Staphylococcus Bacteria, for discovery of something else.
- By mistake he left the Staphylococcus Bacteria in petry dish (device in which Bacteria grow in given medium) & next day he noticed that some of the fungus grow on that petry dish.
- HE Analyse that, where Fungus were grown, no Bacteria were found. Since Fungus release a chemical i.e called Penicillin.

- That Penicillium name was "penicillium notatum".
- For commercial production of Penicillin is produced by "penicillium chrysogenum".
- Full Potential of Penicillin was discovered by chain & Flory
- Fleming, chain & Flory were got "Nobel prize" in 1945.

ACIDS

- 1.) Acetic Acid → Acetobacter Aceti
- 2.) Butyric Acid → Clostridium butylicum
- 3.) Lactic Acid → Lactobacillus
- 4.) Citric Acid → Aspergillus niger

BACTERIA

FUNGUS

- Ethanol is not ACID — but is formed by Yeast [Saccharomyces cerevisiae]

#

Enzyme

→ Lipase enzyme is found in detergent powder to Remove oily spot.

→ Pectinase & Protease enzyme found in Fruit juices to break the cell of fruit.

BioActive Molecules

1.) Streptokinase — It is occur from Streptococcus Bacteria

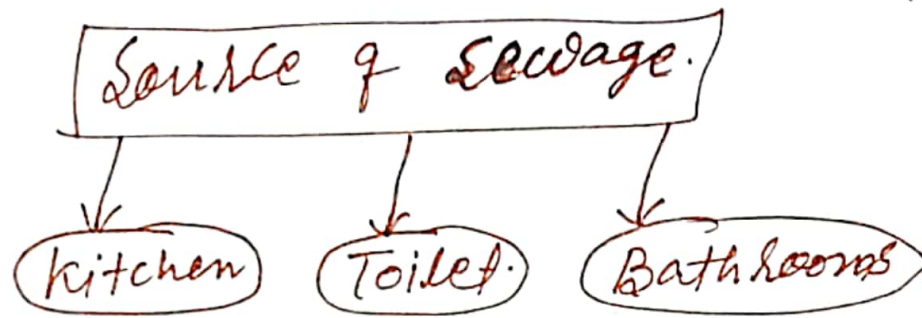
— Streptokinase is clot-buster (dissolving) (during heart attack it clear the passage of heart blood supply i.e coronary Artery)

2.) Cyclosporin-A — It is occur from a fungus (Trichoderma polysporum)

— It shows immuno suppressant (cell-mediated immunity through T-lymphocytes) during organ transplant.

3.) Statin — It is use to Lowering of cholesterol
— It occur from one of the yeast (Monascus purpureus)

Microbes in Sewage plant -



— To Stop water pollution we need to collect all sewage in sewage treatment plant & then flow into River.

⇒ In sewage plant treatment is occur type of

1.) Primary Treatment.

— It is used to treat physical sewage or waste.

— It is performed through sequential filtration & sedimentation.

→ ① In sequential filtration — Floating debris [waste] get collected

→ ② In sedimentation filtration — Primary sludge is collected.

[Sludge: — stones, mud, pebbles, e.t.c)

— Now Rest of Liquid material i.e effluent is move for secondary biological treatment.

2.) Secondary/Biological Treatment

- In secondary treatment, ~~effluent~~ effluent are treated.
- In effluent water various organic matter are present.
- To remove these organic matter from effluent water we introduce Aerobic Bacteria, whose diet/food is organic matter. So that they clean/consume all the organic matter from effluent water.
- We also supply air ~~also~~ for Aerobic Bacteria.
- FLOCS: - Group of Bacteria with fungal Hyphae.
- ⇒ After filtering of water flow it into River & Rest of Activated Sludge collect into another tank.
- ~~using~~ Using the help of Anaerobic bacteria kill all the aerobic bacteria except few for next cycle of treatment.
- Some of Bio-gas (CH_4 , CO_2 , H_2S , H_2) also formed.

Microbes in Production of Biogas.

- From cow dung (Gobar) collecting CH_4 (methane) using the help of methanobacterium (i.e. Anaerobic) is called Biogas plant.
- Since cow-dung is semi-digested material it has various cellulose content.
- These undigested cellulose is digested by methanobacterium & produce methane.
- Bio-gas plant can be implanted by the help of two Board of India.

i) IARI — Indian agricultural Research Institute.

(ii) KVIC — Khadi & Village Industries Commission.

==

Microbes as Biocontrol Agents.

① Bacillus Thuringiensis (Bacteria)
is used ~~as~~ to control pest.

* Pest: — Animal harmful to crops
* Pathogen: — Microbe causing disease.

② Trichoderma: — protect roots from
other soil pathogens.
— It never associated with root but
protect them

③ Baculo virus.

— Baculo virus is a group of big
family of virus i.e called
Nucleopolyhedro viruses.

— It act on some specific type of
pest.

— It is not harmful for Birds, human
& other mammals.

* Note Animal/Insect that control the pest

— Lady Beetle eat → Aphid

— Dragon fly Eat → Mosquito.

Microbes as Biofertilizers.

- Fertilizers is used to increase Soil efficiency ~~use~~ using different minerals.
- Normal fertilizers mainly increase the Nitrogen, Phosphorus & Potassium content into soil.
- Bio-fertilizer: - Organism/microbes which increase the soil fertility.

⇒ Free Living Bacteria Help in Nitrogen fixation in soil.

- i) Azotobacter
- ii) Azospirillum
- iii) BGA/Cyanobacteria.
- iv) Nostoc
- v) Anabaena.
- vi) Oscillatoria.

⇒ Symbiotic Bacteria.

- 1) Rhizobium — on leguminous plant.
- 2) Frankia — Non leguminous plant (Alnus)
- 3) Mycorrhiza — Help in mineral absorption.

