

Industrial microbiology:-

is a branch of applied microbiology which processing of materials by microorganisms (such as fungi, bacteria, algae) or plant and animal cells are used in industrial processes; for example, in the production of various useful end products such as drugs, baking, production of alcohol for beverages, and in fuel production (gasohol). Additional groups of microorganisms form products that range from organic acids to enzymes used to create various sugars, amino acids, and detergents. For example, the sweetener aspartame is derived from amino acids produced by microorganisms.

Areas of industrial microbiology include:- the foods, pharmaceutical, and chemical industries.

✓ First microorganism is used in the industry :

- Yeasts are :-1) eukaryotic unicellular microorganisms. 2) classified as members of the fungus kingdom . 3) Yeasts are connected budding cells known as pseudohyphae or false hyphae. 4) its largest of the bacteria and youngest from the fungi Yeast sizes. :-typically measuring 3-4 μm in diameter. Most yeasts reproduce asexually by mitosis known as budding.

- yeast species either require oxygen for aerobic cellular respiration or are anaerobic.
- Yeast needs moisture , food & warmth to grow. A carbohydrate food source such as molasses is required for reproductive yeast growth .
- Yeast will be appear as large oval or round cells dark blue or violet by crystal violet .

Molasses is a byproduct of sugar beet & sugar cane , supplies the least expensive source of sucrose , glucose & fructose , in addition to (nitrogen , phosphate , sodium carbonate) small amounts of minerals .

Nitrogen is supplemented using ammonia or ammonium salts

Sodium carbonate as processing aids for PH control.

Oxygen to enhance yeast growth.

Examples of Commercial yeasts:

1. *Saccharomyces cerevisiae* = Baker's yeast & Nutritional supplements(B-complex vitamins).

2-*Saccharomyces pastorianus*=*Saccharomyces carlsbergensis* to production of beer(Alcoholic beverages).

3- *Saccharomyces bayanus* & *Saccharomyces uvarum* are used in winemaking and cider fermentation.

4- *Saccharomyces boulardii* as Probiotic.

5-*Candida utilis* =*Torula* to used as a flavouring in processed foods

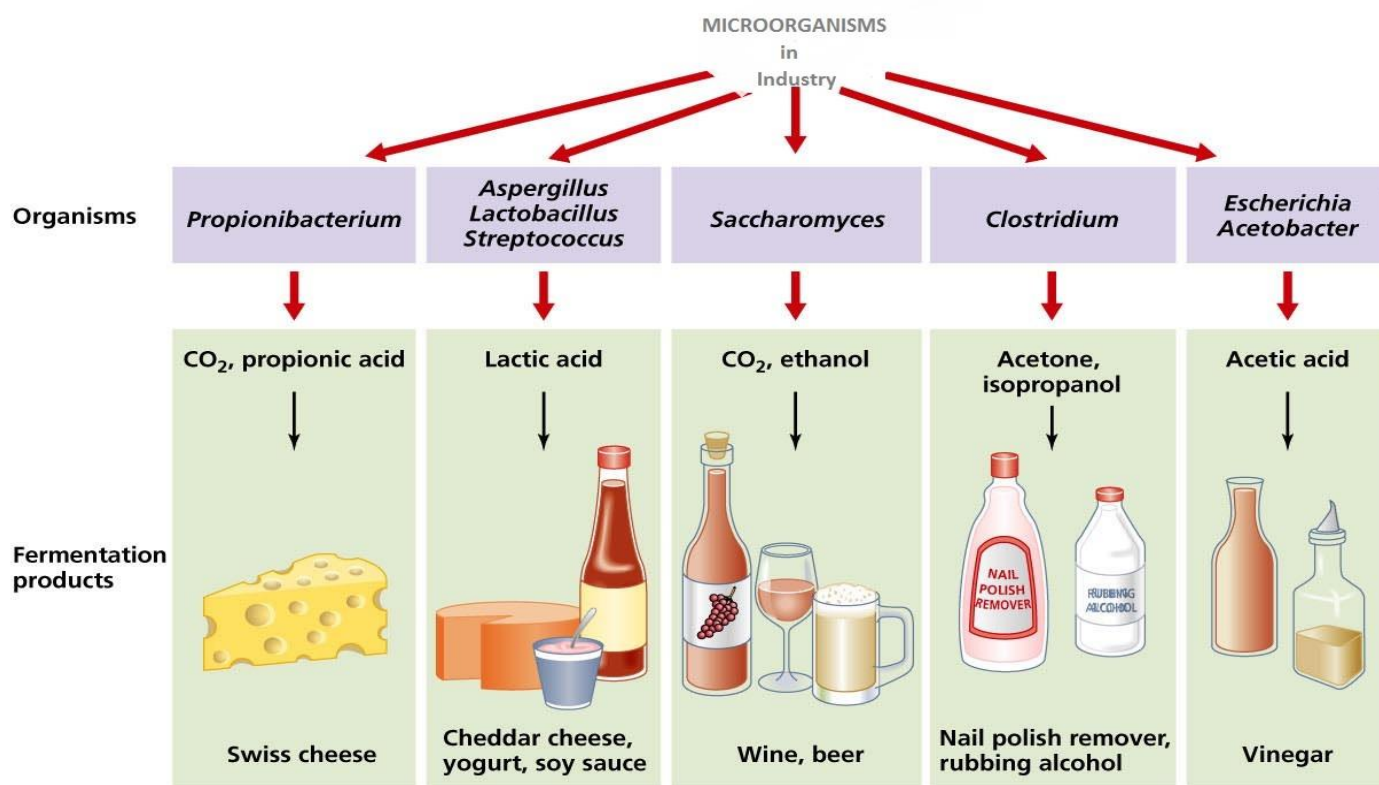


Figure 1 : Uses the microorganisms in industry .

Special media for the growth of yeasts:-

- 1-malt extract agar.
- 2-dextrose potato agar.
- 3-Yeast extract agar.
- 4-Czapek Dox Agar.
- 5-Sabourad agar.

✓ Second microorganism :

- Acetic acid bacteria are: a group of gram-negative bacteria which oxidize sugars or ethanol and produce acetic acid during fermentation. The acetic acid bacteria consist of 10 genera in the family *Acetobacteraceae*. Several species of acetic acid bacteria are used in industry for production of certain foods and chemicals.
- All acetic acid bacteria are rod-shaped and obligate aerobes & motility active.

Acetic acid bacteria are airborne in nature. They are actively present in environments where ethanol is being formed as a result of fermentation of sugars, have ability to convert ethanol to acetic acid in the presence of oxygen.

*Vinegar is produced when acetic acid bacteria act on alcoholic beverages such as wine.

