

قسم التقنيات الاحيائية

المادة: الاحياء المجهرية

المرحلة : الثانية

جامعة الانبار

كلية العلوم

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### **Industrial Microbiology**

1. Microorganisms produce alcohols and acetone that are used in industrial processes.
2. Industrial microbiology has been revolutionized by the ability of genetically modified cells to make many new products.
3. Biotechnology is a way of making commercial products by using living organisms.

### **Fermentation Technology**

4. The growth of cells on a large scale is called industrial fermentation.
5. Industrial fermentation is carried on in bioreactors, which control aeration, pH, and temperature.
6. Primary metabolites such as ethanol are formed as the cells grow (during the trophophase).
7. Secondary metabolites such as penicillin are produced during the stationary phase (idiophase).
8. Mutant strains that produce a desired product can be selected.

### **Immobilized Enzymes and Microorganisms**

9. Enzymes or whole cells can be bound to solid spheres or fibers . When substrate passes over the surface, enzymatic reactions change the substrate to the desired product.
10. They are used to make paper, textiles, and leather and are environmentally safe.

### **Industrial Products**

11. Most amino acids used in foods and medicine are produced by bacteria.
12. Microbial production of amino acids can be used to produce L-isomers; chemical production results in both D- and L-isomers.
13. Lysine and glutamic acid are produced by *Corynebacterium glutamicum*.
14. Citric acid, used in foods, is produced by *Aspergillus niger*.
15. Enzymes used in manufacturing foods, medicines, and other goods are produced by microbes.
16. Some vitamins used as food supplements are made by microorganisms.
17. Vaccines, antibiotics, and steroids are products of microbial growth.
18. The metabolic activities of *Thiobacillus ferrooxidans* can be used to recover uranium and copper ores.
19. Yeasts are grown for wine- and bread making; other microbes (*Rhizobium*, *Bradyrhizobium*, and *Bacillus thuringiensis*) are grown for agricultural use.

### **Alternative Energy Sources Using Microorganisms**

20. Organic waste, called biomass, can be converted by microorganisms into the alternative fuel methane, a process called bioconversion.
21. Fuels produced by microbial fermentation are methane, ethanol, and hydrogen.

### **Biofuels**

22. Biofuels include alcohols and hydrogen (from microbial fermentation) and oils (from algae).

### **Industrial Microbiology and the Future**

23. Recombinant DNA technology will continue to enhance the ability of industrial microbiology to produce medicines and other useful products.

References: 1- Microbiology an introduction TWELFTH EDITION. Gerard. Tortora. 2016.

2- Microbiology an introduction TENTH EDITION. Gerard. Tortora. 2010.