

1. Vaccination has greatly reduced the burden of infectious diseases. The use of food-grade organisms as recombinant vaccine expression hosts and delivery vehicles has been explored during the past 25 years, opening new avenues for vaccinology. Considering that oral immunization is a beneficial approach in terms of costs, patient comfort, and protection of mucosal tissues, the use of food-grade organisms can lead to highly advantageous vaccines in terms of costs, easy administration, and safety. The organisms currently used for this purpose are bacteria (*Lactobacillus* and *Bacillus*), yeasts, algae, plants, and insect species. Herein, a comparative and updated scenario on the production of oral vaccines in food-grade organisms is provided and placed in perspective. The status of clinical evaluations and the adoption of this technology by the industry are highlighted. (25 分)
2. Contamination of food by bacterial pathogens presents an everlasting challenge for both food industry and health care systems on a global scale, causes foodborne illness and death, and carries a high economic burden. Bacteriophage endolysins (peptidoglycan hydrolases) have emerged as a new class of antimicrobial agents useful for controlling bacterial infection or other unwanted contaminations in various fields, particularly in the light of the worldwide increasing frequency of drug-resistant pathogens. Besides the use of native and engineered endolysins for controlling bacterial contamination at different points within the food production chain, this also includes the application of high-affinity endolysin-derived cell wall binding domains for rapid detection of pathogenic bacteria. (25 分)
3. Aquatic microorganisms regulate and modify the chemical composition of their environment through their production and consumption of organic matter, their involvement in nutrient cycling, and their scavenging of trace metals. Microorganisms also mediate specific reactions in their environment through extracellular, chiefly enzymatic, reactions. These reactions enable microbes to obtain what they need for growth. (10 分)
4. Adsorption is the net accumulation of matter at the interface between a solid phase and an aqueous solution phase, resulting in the formation of a two-dimensional molecular arrangement on the surface of the solid. It differs from precipitation because it does not include the development of a three-dimensional molecular structure, even if such a structure grows on a surface. (10 分)
5. Colloids are solid particles of very low water solubility with a diameter ranging between 0.01 and 10 μm . Colloidal suspensions are said to be stable if no measurable gravitational settlings of the suspension occurs over practical time period. The process by which a colloidal suspension becomes unstable and undergoes gravitational settlings is coagulation. (10 分)
6. Spectroscopic methods are designed to yield data on the transitions among the energy levels accessible to a chemical species. These data are then interpreted to elucidate molecular structure, often by comparison with related spectra of suitable model compounds or, more quantitatively, by a calculation of molecular properties. (10 分)
7. The first shell of water molecules around a strongly solvated ion is usually referred to as the primary hydration shell. This is where the water molecules are most restricted in their motion. But the effect does not end there; it propagates out well beyond the first shell. Thus, in the second hydration shell the water molecules are freer to rotate and exchange with bulk water; in the third shell even more so, and so on. (10 分)