An overview on fermentation in this era of 2020

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Editorial

Fermentation is another anaerobic (non-oxygen-requiring) pathway for breaking down glucose, one that's performed by many types of organisms and cells. In fermentation, the only energy extraction pathway is glycolysis, with one or two extra reactions tacked on at the end.

Fermentation and cellular respiration begin the same way, with glycolysis. In fermentation, however, the pyruvate made in glycolysis does not continue through oxidation and the citric acid cycle, and the electron transport chain does not run. Because the electron transport chain isn't functional.

Lactic acid fermentation

In lactic acid fermentation, NADH\text {NADH} NADH start text, N, A, D, H, end text transfers its electrons directly to pyruvate, generating lactate as a by-product [1]. Lactate, which is just the deprotonated form of lactic acid, gives the process its name. The bacteria that make yogurt carry out lactic acid fermentation, as do the red blood cells in your body, which don’t have mitochondria and thus can’t perform cellular respiration [2-3].

LA is produced biosynthetically (90%) by fermentation of sugars(e.g. glucose) using pure cultures of lactic acid producing bacteria. LA is a natural hydroxyl acid and is used extensively in the food industry (85% of the LA market) as an acidulant, flavouring or preservative agent [4-6]. Furthermore, LA is used in the pharmaceutical industry as a pH regulator, and recently as the bioplastic, polylactic acid (PLA), for use in medical devices. PLA is also gaining traction as a sustainable substitute for petroleum based plastics.

Fermentations are highly expensive with commercial media for certain type of microorganism, the use of inexpensive raw materials (e.g. PPW, AS and SCG) leads to a profitable process. These wastes contain compounds for bacteria growth to produce bio-products. The aim of this study was to use natural mixed microbial consortia isolated from coffee mucilage to ferment PPW, AS and SCG to yield LA. The effect of various biomass pre-treatment regimes (starch gelatinization, hydrothermal pre-treatment, hydrothermal and cellulose pre-treatment with and without CaCO3buffer) were employed to maximize LA production. This simple and novel approach can potentially maximize the value of food wastes to produce LA.

Lactic acid produced in muscle cells is transported through the bloodstream to the liver, where it’s converted back to pyruvate and processed normally in the remaining reactions of cellular respiration.

Alcohol fermentation

Alcoholic fermentation is a complex biochemical process during which yeasts convert sugars to ethanol, carbon dioxide, and other metabolic by-products that contribute to the chemical composition and sensorial properties of the fermented foodstuffs. Alcoholic fermentation is the basis for the manufacturing of alcoholic beverages such as wine and beer [7].

Control of fermentation is generally considered as a prerequisite to determine the quality of the final product. In this context, fermentation monitoring is a growing need, which calls for fast, low-cost, and non destructive methods providing real-time or online information in order to assure an effective control at all stages of the process. In this chapter, after a brief description of the main aspects of the alcoholic fermentation, an overview on the applicability of the electronic nose and the electronic tongue to the alcoholic fermentation monitoring has been presented and discussed [8,9].

Another familiar fermentation process is alcohol fermentation, in which NADH\text {NADH} NADH start text, N, A, D, H, end text donates its electrons to a derivative of pyruvate, producing ethanol. Going from pyruvate to ethanol is a two-step process. In the first step, a carboxyl group is removed from pyruvate and released in as carbon dioxide, producing a two-carbon molecule called acetaldehyde [10].

Alcohol fermentation by yeast produces the ethanol found in alcoholic drinks like beer and wine.

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