Review of xanthan gum production from unmodified starches by Xanthomonas comprestris sp.

Abstract

Many attempts were reported to optimise variables in xanthan gum fermentations, i.e. the nutrient composition and feeding technique, temperature, pH, agitation, and adding antifoam. All shows some improvement in the area studied. Other substrates were also tested, such as hydrolysed rice, barley and corn flour, acid whey and sugarcane molasses, etc., but glucose is still the best in-term of the product yield, supply, and the product quality. Sufficient studies of the unstructured kinetics and the structured kinetics models were described in batch processes but the continuous kinetic model is insufficiently cared. Looking at the conventional xanthan production, mixing is the main problem occurred in batch fermentation as the produced broth during the production stage is very viscous, therefore mixing requires considerable balance between cell disruptions and oxygen transfer. Giving the support, e.g. cotton wool and fabric, for microorganisms to adsorb may ensure the nature physical separation between microorganisms and the liquid phase containing nutrients and products. However, the specific xanthan productivity was reported low due to relatively low cell viability. The problem of the limited oxygen transfer suggests that a new bioreactor design is required. The design strategy could be by freely moving of the liquid media and air passing through the porous fibrous matrix, therefore should ensure a good contact between cells that adsorb onto the fibrous matrix support and nutrients. This strategy should improve oxygen transfer, and may increase the reaction rate and reduce the fast growing of mutation. Using ultrafiltration was reported save up to 80% of the energy is required for recovering of xanthan gum.