

# **Fermentative production of Biobutanol from industrial food processing wastes using strains of clostridia**

**Author:** Martin Swartz

**Project Advisor:** Katrina Cornish

Increasing crude oil prices and environmental pollution concerns have brought significant attention to researching alternative and more sustainable energy resources. The primary focus of this project was to study the biofuel production of butanol from organic waste materials of industrial foods. Biobutanol is considered to be carbon neutral in the environment because butanol emits only CO<sub>2</sub> during heat combustion (unlike fossil fuels which also emit CO) and this CO<sub>2</sub> can then be absorbed by photosynthetic processes in the living biomass.

First, 48 industrial food waste samples were analyzed for their Carbon:Nitrogen composition, energy content, and mineral composition. Based on this information, ten of the most ideal samples were then analyzed for initial carbohydrate content. Next, a batch-fed fermentation was conducted of four wastes containing ideal sugar amounts using suitable strains of Clostridia to determine potential uses. The samples were measured frequently to monitor the amount of Acetone, Butanol, and Ethanol (ABE) that had been produced. Three starch-based samples were concluded to have adequate levels of butanol production.

Potentially, Biobutanol production can lead to providing energy for use as a fuel. Butanol may be used directly in a combustion engine without modification, and it contains a nearly equivalent level of calorific value to gasoline. Considering butanol producing biomass cost, food processing waste might be a suitable substrate for butanol production. Inarguably, biobutanol production is an area worth considering in pursuing development of alternative energy resources.