CAPSTONE EXPERIENCE 2012
Freeze Dried Salsa Spice

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Objective:

The goal of our project is to make a salsa spice. By applying our unit operations, we will be able to develop a product that is relatively new to the market.

The main unit operation of our project will be freeze drying salsa. Drying food is a dehydration process in which the water from a food product is removed. Removal of the water helps to extend the shelf life. Increased shelf life is achieved by lowering the water activity to a level which inhibits microbial growth. Freeze drying is one technique that can be used to dry foods, pharmaceuticals, and biotechnology products.

The overall process involves freezing the food then dropping the pressure to near vacuum levels. Once the pressure drops to a sufficient level, the solid water in the product sublimes to a gaseous state. Once the solid water is removed from the product, the unfrozen water is removed using a subsequent drying step. The temperature is raised higher than in the first drying step, and the pressure is dropped even lower. After both drying steps are complete, the vacuum is broken, and the product is sealed. Water levels are typically low for freeze dried products, 1-4% of the final product weight.

Market Research:

This product is very new to the market. The process of freeze drying is common, with various types of fruits, ice creams, and food for NASA and campers. However, there is no current product that is equivalent to our Salsa Spice. The market is huge for regular salsa, which gave us the idea of this spice. We believe this product could be successful if we used are market as Mexican restaurants and companies that produce tortilla chips. This spice could easily be incorporated into the chip dough, because it would provide no excess water in the dough. This would give the chips a salsa flavor, depending on how much was incorporated.

Ingredients:

1. Roma Tomatoes
2. Green Peppers
3. White Onions
4. Jalapenos
5. Cilantro
6. Crushed Red Pepper Flakes
7. Chili Powder
8. Salt and Pepper
9. Cumin

Processing Steps:

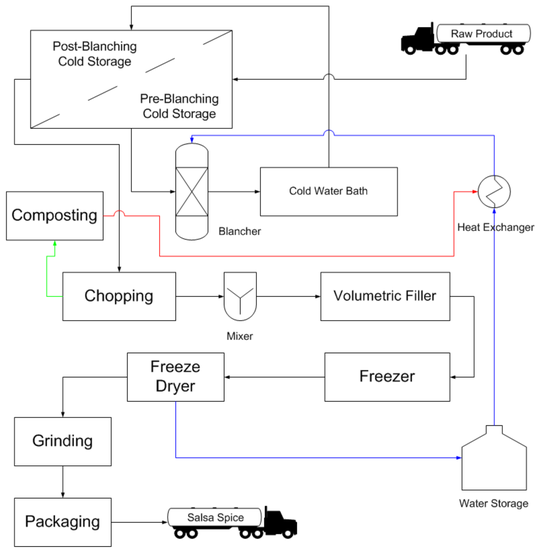
1. Blanching
2. Chopping
3. Mixing
4. Volumetric Filling
5. Freezing
6. Freeze Drying
7. Grinding
8. Packaging

Mass Balance:

- Each batch starts with a total of 2,500 lbs of raw product
- One batch will be ran per day
- Assume 5% mass loss after chopping due to waste
- There will be 25 days of operation per month
- 62500 lbs of raw material will be used each month
- 117,843 4oz. bottles of Salsa Spice will be produced per month

Energy Balance:

- Blanching, freezing, and freeze drying processes will contain changes in the energy balance
- Energy costs required for blanching per month = 80.64 $/month
- Energy costs required for freezing per month due to heat of fusion = 249.71 $/month
- Energy costs required for freeze drying per month due to heat of sublimation = 1536.34 $/month
- Total cost of energy for process = 1866.69 $/month



Disadvantages:

- Expensive
- Lengthy process times
- Unknown market for product

Reducing Waste:

- 1200 lbs of water per batch are removed from the freeze dryer
- This water will be stored and used when needed
- Blanching will occur once a week with the stored water
- Waste from chopping raw product will be composted
- Heat created from composting will be used to pre-heat water prior to blanching
- Finished composted product will be sold as fertilizer

Advantages:

- Increase the shelf life up to years
- Can be stored unrefrigerated until opening
- No additives or preservatives are used
- Easy preparation
- Lightweight product