Nutrition Information NIRC Resource Center

Fact Sheet

Oxidative Rancidity

The most important cause of Deterioration in fats and fatty foods is oxidation. Oxidation of fats results in the replacement of an oxygen ion for a hydrogen ion in the fatty acid molecule. This substitution destabilizes the molecule and makes it possible for other odd chemical fragments to find a place along the chain. What we perceive is an unpleasant change in the flavor and odor of a food, called rancidity. Unsaturated fats are more susceptible to oxidation than are saturated fats. Factors which acclerate fat oxidation include trace metals (iron, zinc, etc.), salt, light, water, bacteria, and molds. Fat oxidation can be retarded by use of antioxidants (such as BHT, BHA, vitamin E, and vitamin C), by use of spices such as sage and rosemary, and by use of light and/or air tight wrapping. Antioxidants which are added to foods must be listed on the label. Some high fat foods such as potato chips are packaged in materials that protect them from light and oxygen and the containers are flooded with nitrogen to further exclude oxygen. The nitrogen also serves as a cushion to minimize breakage of the chips during transport.

In this exercise, flavor changes in a high fat food and a fat free food will be measured over time. Both foods will be stored in environments that allow passage of light and that minimize the passage of light.

Supplies

- Fresh potato chips
- Raisins
- 4 pint or quart canning jars with lids
- aluminum foil
- tape

Procedure

1. Wrap two canning jars with aluminum foil and tape it in place so that no light can enter the jar.

2. Taste the potato chips and the raisins and rate their flavor on the following scale:

1 = extremely dislike the flavor
2 = slightly dislike the flavor
3 = neither like or dislike the flavor
4 = slightly like the flavor
5 = extremely like the flavor

3. Place the rest of the fresh potato chips in one of the foil covered jars and in one of the unwrapped jars. Place the rest of the raisins in the other foil covered jar and the other unwrapped jar. Cap each jar tightly to minimize the amount of air that enters the jar. Leave the capped jars in a place where they may be exposed to light, such as a window sill.

4. Taste the potato chips and the raisins from each jar every 2 days for 2 weeks. Each time you taste the foods, rate their flavor by the same scale listed in step 2.

5. Make a graph of your data on the flavor of the potato chips and raisins stored these two ways versus storage time. The y-axis of your graph should be the flavor score and the x-axis the time in days.

Follow up questions

Is the flavor of food affected by the way the product is packaged?

Should packaging differ in foods containing fat compared to foods that do not contain fat?

Are the potato chips that you purchase at the store packaged in containers that permit light to enter or that exclude light?

The Nutrition Information Resource Center is a collaborative effort of the Department of Food Science and Human Nutrition in the College of Agriculture, Forestry, and Life Sciences at Clemson University and the South Carolina Nutrition Council, South Carolina State University and Tri-County Technical College. For more downloadable fact sheets, go to *http://virtual.clemson.edu/groups/NIRC/*.