



CALIFORNIA STATE SCIENCE FAIR 2009 PROJECT SUMMARY

Name(s) John Berba	Project Number J0505
Project Title Which Grease Is Good for You?	
Objectives/Goals This project focuses on proving that vegetable oil will degrade in quality when fried five times, and if the addition of Vitamin E(antioxidant) will help in retaining the oil's quality.	
Abstract Four types of vegetable oil -Extra Virgin olive, Extra Light Olive, Canola, and Extra Virgin Coconut, with and without Vitamin E were heated repeatedly in a 400ml glass beaker for five times at 178degC for 4 minutes and allowed to cool to 80degC before reheating. To measure the degree of oxidation and rancidity, the oil samples were then tested in the lab to measure the peroxide value using sodium thiosulfate(Na ₂ S ₂ O ₃) as a titration solution and the amount of free fatty acid using potassium hydroxide(KOH) as a titration solution. The viscosity of each sample were also measured at room temperature by dropping 10 plastic round beads into the oil in a 200ml graduated cylinder. These oil samples were also tested using triangle method to test the change in color, taste and odor.	
Methods/Materials Four types of vegetable oil -Extra Virgin olive, Extra Light Olive, Canola, and Extra Virgin Coconut, with and without Vitamin E were heated repeatedly in a 400ml glass beaker for five times at 178degC for 4 minutes and allowed to cool to 80degC before reheating. To measure the degree of oxidation and rancidity, the oil samples were then tested in the lab to measure the peroxide value using sodium thiosulfate(Na ₂ S ₂ O ₃) as a titration solution and the amount of free fatty acid using potassium hydroxide(KOH) as a titration solution. The viscosity of each sample were also measured at room temperature by dropping 10 plastic round beads into the oil in a 200ml graduated cylinder. These oil samples were also tested using triangle method to test the change in color, taste and odor.	
Results It was observed that there was an increase in peroxide value between the unheated and heated samples. An increase in free fatty acid was also observed although in most cases the delta were lower in the heated samples with Vitamin E. The results also showed that there was a significant difference in the sensory properties between the heated and the unheated samples. The differences were prevalent in color, but were more pronounced in taste and in odor.	
Conclusions/Discussion The hypothesis that the vegetable oil's properties degrade subsequent to being fried 5 times was proven to be correct. The experiment also met the hypothesis for adding vitamin E did decrease the degradation of the oil's quality. The healthiest oil would be extra light olive oil, because although the oil did not have the lowest peroxide value or free fatty acid level in the unheated state, the oil had remained stable despite the five fryings, and according to the results on peroxide, had almost no delta. The oil has a decent viscosity, medium low peroxide level, and medium free fatty acid level.	
Summary Statement This project tested if vegetable oil will degrade in quality after frying 5 times and if adding Vitamin E(antioxidant) will help preserve the quality of oil.	
Help Received Teacher - Mrs. Erin Schumacher, Scientific adviser - Danilo Lambino (Formulae 8), Performed lab testing at Miramar College Science Lab with supervision from Tien Nguyen (Lab Technician) and Vuong Nguyen (Lab supervisor). The researcher's parents.	