



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Rebecca S. Lim	Project Number J0810
Project Title Plastic Identification Analysis and Recycling Test: A Model for the Future	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To find the most efficient way where plastic waste can be reduced for the increasing demands in the future where raw materials will not be readily available. To determine the factor/s that affect how well a plastic recycles for creating a perfect thermoplastic material. To find an alternative way besides landfilling, incineration, and recycling, where mixed plastic waste and virgin plastics can create an efficient method of standard plastic manufacturing without the expected results of fragility or aging.</p> <p>Methods/Materials Primary-Prepare plastic films (2x4 strips) and virgin pellet samples of the following 6 recyclable thermoplastics: PET, HDPE, PVC, PP, PS, and PC. Perform 8 identification analysis tests: thermoplastic/thermosetting; diphenylamine spot; Beilstein; density; solubility; burn; Pyrolysis; and stretch-tear tests. Using the order of easiest to most difficult to recycle, compare and contrast the identification results of chemical and mechanical properties to find the factor/s that makes one polymer more recyclable. Using the 4 fluids (distilled water, saturated sodium/magnesium/calcium chloride) from the density test, determine the best fluid where the 6 types of mixed pellets have the most distinctive sinking, floating, or suspension mark in the fastest time. Divide it into levels by experimenting with a small cup with a portion of the pellets and mark off the levels.</p> <p>Results Flammability makes a plastic easy to recycle but it is a disadvantage in plastic manufacturing. We don't need new thermoplastic invention, rather an environmental safe processing alternative where waste and virgin materials can be reused with the same good qualities. A plan with 3 zones was constructed: 1st Zone-Cleaning and Particle Size Reduction. Zone 2: Suspension of mixed pellets at levels due to density variations. Zone 3: Proceed with production of each pellet after vacuum and drying from divided levels.</p> <p>Conclusions/Discussion Instead of creating an easy to recycle, flammable material, a simple alternative is using the 3-zone process. However, there still maintains to be a problem due to the increasing use of chemical additives. The future may continue the work I have been doing through means of high technological advancements, perhaps by looking into a device that mechanically breaks chemical bonds of polymers and forms new copolymers that act as a #bridge# between different polymers, the problem our world faces may be resolved.</p>	
Summary Statement My project tested various alternatives of recycling plastics through processes of applying the chemical and mechanical characteristics in order for the future to discover other options available other than environmentally harmful ways.	
Help Received My parents helped gather materials; Chris Hinton-Talco Plastics gave permission to use lab; Jerry Sieger-CCC Co. gave tour of manufacturing process; Cal State Fullerton Chemistry Dept. allowed for use of lab materials	