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## ***Process Evaluation Section***

# **Recovery of Plastics Via Froth-Flotation from Nylon Manufacturing Waste**

### **Problem/Opportunity**

Argonne National Laboratory, SDR Plastics, Inc., and West Virginia University (WVU) are working to develop a cost-effective technology for the recovery of high-purity engineered plastics from mixed plastics waste streams generated by the nylon manufacturing industry. These waste streams contain nylon 6, nylon 66, nylon 10, nylon 12, polyethylene, polyethylene terephthalate (PET), polycarbonate, and polyvinyl chloride (PVC).

### **Approach**

ANL had previously developed and patented a froth-flotation process to separate and recover equal-density plastics from mixed plastics waste streams. The objective of this project is to adapt our froth-flotation technology to recover nylon from manufacturing scrap for re-use.

This project is intended to answer the following questions:

- (1) Can the plastics be separated from the waste streams at purities greater than 98%?
- (2) How do the properties of the recovered plastics compare with those of the virgin plastics?
- (3) Can the recovered plastics be compounded to meet the specifications of commercial plastics?

- (4) What is the cost of recovery of these plastics from the waste streams?

The work is organized into the following tasks:

- (1) Characterization of the nylon waste streams
- (2) Definition of process conditions for separating selected plastics from the waste streams
- (3) Characterization and evaluation of the recovered plastics
- (4) Preparation of reformulated compounds using the recovered materials
- (5) Comparison of the reformulated compounds relative to virgin compounds, and
- (6) Conceptual Design for and economic analysis of the process

### **Results**

This project was initiated in October of this year. Two samples of plastics manufacturing scrap have been received, characterized, and separated in batch reactors. In both cases, an essentially 100%-pure nylon product was recovered. Process-flow diagrams have been developed.

### **Future Plans**

We plan to continue development of the process. The first step is to conduct pilot-scale tests (1,000 lb/hr) using the froth-

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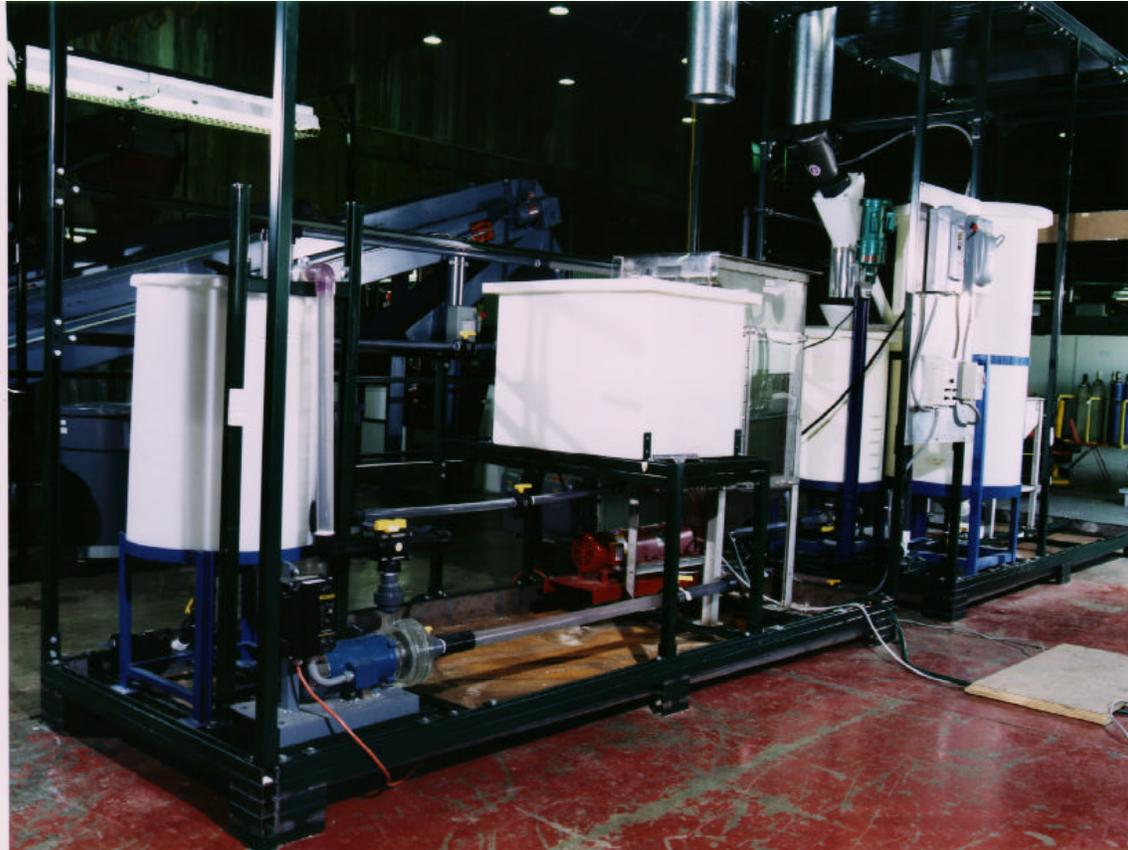
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flotation equipment that we designed, built, and used for separating other plastics waste streams and then help our industrial partners commercialize the technology. A large separation test will be conducted using our 50 lb/hr froth-flotation test stand to

confirm process effectiveness and costs. A demonstration project at SDR Plastics is being developed.



**Froth-Flotation Test Stand**