CHAPTER III

EXPERIMENTAL PART

3.1 Materials

1. High density polyethylene, blow molding grade (G 2855) from TPI (Thai Petrochemical Industry) with density 0.955 g/cm^3 and melt flow index (190°C/2.16 Kg.) 0.35 g/ 10 min.(report from TPI).

2. Poly (ethylene terephthalate), PET from post consumer drinking water bottles. Before reprocessing PET bottles were shreded into small chips.

3. Maleic anhydride grafted polyethylene (ADMER) AT 4696 from Mitsui Petrochemical Industry. This material was used as the compatibilizer in reprocessing of ternary blend . The reason for using this material as compatibilizer is the anhydride group provided the interaction with hydroxyl end groups of PET and the polyolefin chain provided the miscibility with HDPE.

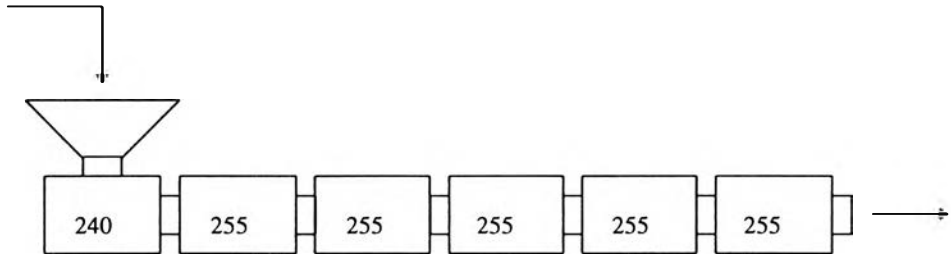
3.2 Experimental

3.2.1 Preparation the material

a. Binary blend

HDPE and PET were mixed by various ratios by mixer (5% PET, 10%PET, 15% PET, 20% PET) and then took the premixed material to process in the Collin twin screw extruder ZK-25. Temperature settings along the barrel were 200 °C for zone 1, 240 °C for zone 2, and 255 °C for zone 3 - 6, screw speed = 30 rpm. The materials were fed in zone 1. The extrudates

were cooled in water at 25°C and pelletized by granulator. These pellets were then taken to be continuously reprocessed by the twin screw extruder. In each pass of pellets were collected for testing properties.



This set of temperature series was obtained by trial and error. Also, Jabrin et al. used this set of processing condition[11, 1992].

b. Ternary blend

Mixed HDPE and PET with various ratio (10%PET, 20% PET, 50%PET) included 5% maleic anhydride grafted polyolefin in each ratio of the blends. Then premixed materials were taken through twin screw extruder. The procedure of the preparation was the same as the processing for binary blend.

3.2.2 Testing the properties

a. Mechanical properties

The samples were prepared for this test by taking the pellets that obtained from processing step to compress under the pressure 140 psi (952,380 bar) at 230 °C for 5 min. and cool at 23 °C for 5 min. These

specimens were used to test the mechanical properties according to ASTM procedures.

- *Impact testing* : followed ASTM D256 (A), Izod type. Testing temperature was 25 °C. The size of specimens for testing were 12.75 mm in width and 63.5 mm in length. Notch type "V" and the depth is 2.5 mm., using the pendulum impact test, model Zwick.

- *Flexural testing* : followed ASTM D790-92. Testing temperature was 25 °C, using an Instron Universal Testing machine. The speed of the cross head was 1.3 mm/min. Span to depth ratio was 1:16

- *Tensile testing* : followed by ASTM D638-91. Testing temperature was 25 C. Speed of the cross head was 50.8 mm/min.

The reported values for all properties are the average of at least five determinations.

b. Scanning Electron Microscopy

Fracture surfaces of pellets and impact bars were examined by coating gold for ground the samples. And drying the gold coated samples were examined in a Jeol JSM 5200.

c. Melt viscosity of blend component

Each pass for each ratio of blends were taken to identify the melt viscosity followed ASTM D 3835-90 by using Instron Capillary Rheometer model 3213 at 255 °C and shear rate range from 10 to 1000 1/sec with a 25

KN load cell (The L/D ratio of capillary die was 40, so the end effect was neglegible).

Diagram of the Experiment