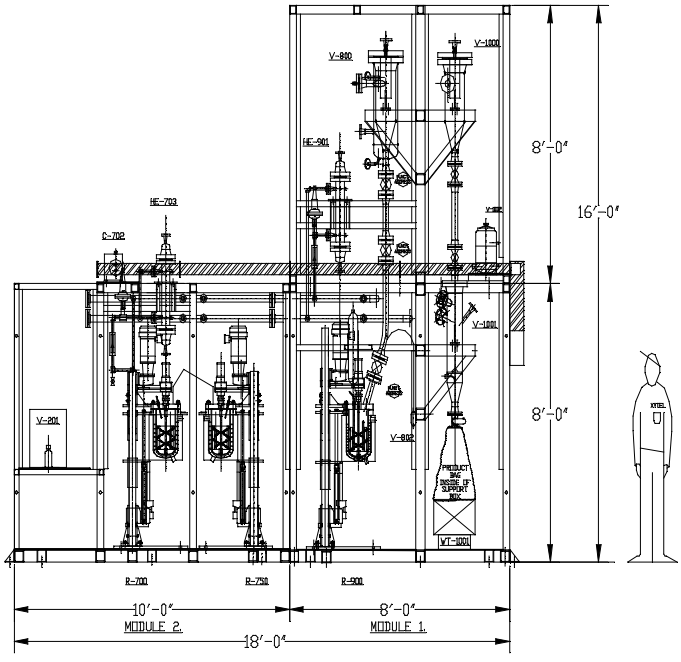
Table I. Types and Sizes of Pilot Polyolefin Reactors

TYPE	SIZE AND PRODUCTS	POLYMERIZATION MODE	USES
Laboratory batch units	0.5 - 2 Kg/batch PE homopolymers PP homopolymers Random copolymers	Single Reactor hydrocarbon slurry bulk slurry stirred gas phase Batch catalyst addition Supported ZN, SSC or	atalyst screening easure catalyst parameter activity and decay rate ualitative prod. properties
Continuous bench scale units	2 to 5 Kg/hr capacity PE homopolymers PP homopolymers Olefin random copolymers High impact EP copolymers	., 2, or 3 Reactors hydrocarbon slurry CSTR bulk slurry CSTR stirred gas phase fluid bed gas phase	atalyst evaluation, kinetics rocess scale-up studies akes commercially relevan resins netics and Yield response
Pilot and	10 to over 200 Kg/hr capac	Multiple reactor for all	scalable to commercial units

Figure 1. 5 Kg/hr Continuous Polymerization Unit for Polypropylene



FRONT ELEVATION VIEW

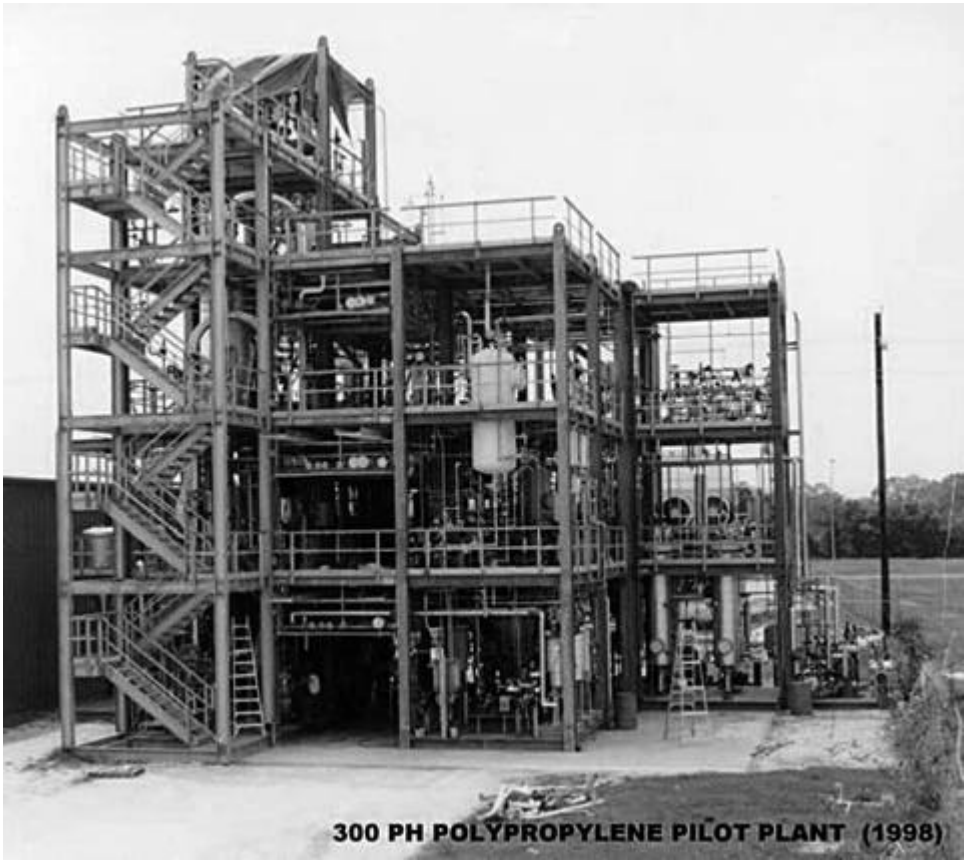


Figure 2. Very Large Continuous Multipurpose Polyolefin Facility

Table II

PIPELOOP REACTORS, DESIGN SCALING FACTORS

Scale Si	Ben				

*Overall Heat Transfer Coefficient, U
mega-J = Joule x 1,000,000 ; Viscosity, 1000x newton-sec/sq meter = kN-s/sq m

Table III
GAS FLUIDIZED REACTORS, DESIGN SCALING FACTORS
(Non-supercondensing)

Scale S				

The reactor in the second-from-right is operating as an impact copolymer final reactor.

* Overall heat transfer coefficient, U, based on jacket **only**. Note that the U for the large fluidized beds is based on sq-m of x-sectional bed area

** Superficial gas velocity, m/s

*** Diameter Ratio, $D_{particle}$ / D_{tank}

`` Actually a CSTR

‘ per sq-m refers to x-sectional area in a fluid bed

Table IV

STIRRED TANK REACTORS, DESIGN SCALING FACTORS

Scale‡			
_____			
_____			
_____			

* Overall heat transfer coefficient, U, based on jacket **only**

** Diameter Ratio, Dparticle / Dtank ; Viscosity, 1000x newton-sec/sq meter = kN-s/sq m

Table V
AGITATED GAS-PHASE HOMO-REACTORS, DESIGN SCALE FACTORS

Scale Si				
_____				
_____				
_____				

* Overall heat transfer coefficient, U, based on jacket **only**

** Superficial gas velocity, m/s

`` Actually a CSTR

Figure 4. Hexane Slurry Process for HDPE

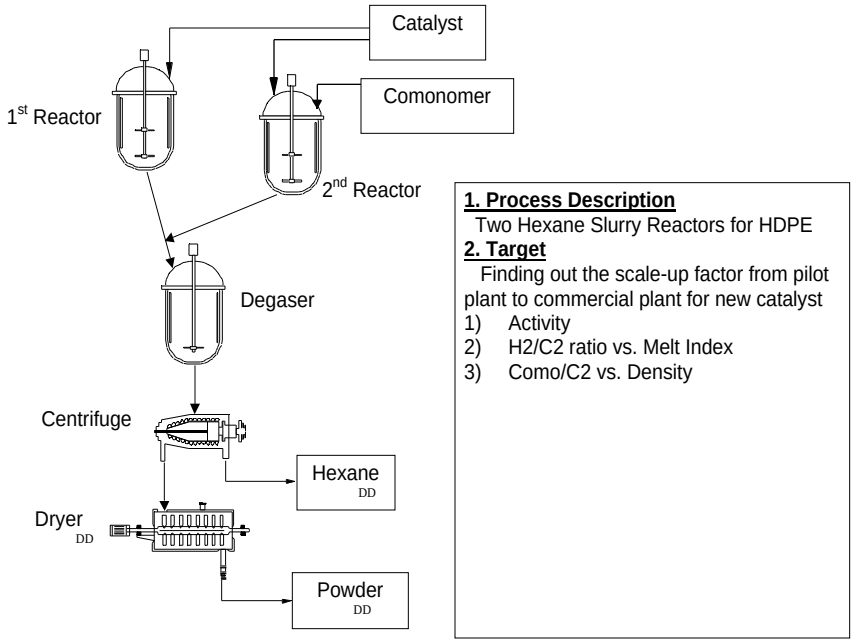


Figure 5. Comonomer Response