

BATCH REACTION (BR) PILOT PLANT

Mod. RE/EV
Mod. REc/EV
Mod. REa/EV

manual
manual with data logging
automated

RE



INTRODUCTION

This pilot plant concerns the batch reaction; the study of kinetics is carried out versus the variation of conductivity in the reactor.

This reactor includes a cooling jacket, an electric heater and a distillation column with variable reflux condenser and azeotropic separator.

The automated version mod. REa/EV is equipped with PID controller for the automatic control of reaction temperature and of the stirrer rpm.

TRAINING PROGRAM

This unit enables to deepen the following issues:

- Determination of reaction kinetics
- Reaction thermodynamics

- Mass and energy balance
- Automatic temperature and rpm control with PID controller (for mod. REa/EV, only)
- Plant supervision by P.C. (for mod. REa/EV, only)
- Exercises that can be carried out:
 - kinetics of hydrolysis of ethyl acetate
 - preparation of p-Toluensulfonic acid
 - preparation of diethyl adipate
 - reaction of urea with nitrous acid
 - preparation of cyclohexanone oxime from hydroxylamine sulfate and cyclohexanone
 - transformation of acetic anhydride into acetic acid and display of reaction kinetics by measurement of conductivity
 - preparation of amide

TECHNICAL SPECIFICATIONS:

Mod. RE/EV

- Wheeled framework of AISI 304 stainless steel
- Jacketed reactor of borosilicate glass, with capacity of 10 l
- Stirrer of AISI 304 stainless steel
- Geared motor of the stirrer with tachogenerator, and variable speed of 0 to 400 rpm
- Electric heater for reactor, P = 2.5 kW
- Distillation column of borosilicate glass, DN 50, h = 600 mm
- Reflux head of borosilicate glass equipped with solenoid valve for the control of reflux ratio
- Over head condenser of borosilicate glass, with exchange surface of 0.3 m²
- 2 flasks of borosilicate glass for collecting the condensate, with capacity of 5 l
- 2 graduated vessels of borosilicate glass for adding reagents
- Azeotropic separator of borosilicate glass
- 2 electronic temperature indicators
- 2 thermoresistances Pt 100 with sheath of AISI 316 stainless steel
- Microprocessor electronic conductivity transmitter
- 2 programmable timers for the control of reflux ratio
- Thyristor unit for the control of heating power
- Pneumatic valve of AISI 316 stainless steel
- Vacuum gauge of AISI 316 stainless steel with range of - 1 to 0 bar
- Circuit for the connection with vacuum pump (not included)
- Piping and valves of AISI 304 and AISI 316 stainless steel
- Switchboard IP55, complying with EC conformity mark, including plant synoptic and ELCB
- Emergency button

Mod. REc/EV

Besides being provided with all the characteristics of mod. RE/EV, this model also includes the following additional items:

- Interface for the connection with a PC included in the switchboard
- Data acquisition software for Windows

Mod. REa/EV

Besides being provided with all the characteristics of mod. RE/EV, this model also includes the following additional items:

- Microprocessor digital PID controller with serial card
- Supervision software for Windows: it enables to control ON-OFF signals, analog signals coming from PID controller, real-time trend and historical trend

Dimensions: 2000 × 800 × 3000 mm

Weight: 290 kg

REQUIRED

UTILITIES (PROVIDED BY THE CUSTOMER)

- Power supply: 400 Vac 50 Hz three-phase - 7,5 kVA (Other voltage and frequency on request)
- Tap water: 150 l/h @ 2 bar (valve with ½" hose connector)
- Compressed air: 1 Nm³/h @ 6 bar (valve with connection of ¼" F)
- Water drain
- Fume suction system

ACCESSORIES (NOT INCLUDED)

- Personal Computer running Windows (for mod. REc/EV and mod. REa/EV, only)
- Laboratory Vacuum Pump

SUPPLIED WITH

THEORETICAL – EXPERIMENTAL HANDBOOK



VARIATIONS OF THE PLANT ON REQUEST

The equipment can be modified on request of the Customer.