

CHEMICAL ENGINEERING

IC61D - Multifunctional Reaction Plant - Code 993200



1. General

The IC61D system is a highly versatile training unit which can be used as a reaction set either for organic synthesis, or for one-directional distillation.

By fitting an optional unit, it can be used to perform the reaction process in vacuum conditions, with or without the addition of liquid.

It is available an automatic data acquisition and analysis system for Personal Computer called SAD/IC61D, which makes it possible to monitor the reaction process and to file the experimental data on disk or print them out.

The system is supplied with a teaching manual illustrating its operation and the theoretical principles of organic synthesis and containing a series of exercises with a step-by-step guide on their execution.

2. Composition

- Basic plant (code 993200)
- Optional device for vacuum operation (code 991110)
- Automatic data acquisition system for Personal Computer SAD/C61D, consisting of:
 - Electronic transducers and signal conditioning kit and A/D conversion board (code 914442);
 - Data acquisition and analysis software (code 914443).

3. Description

Basic plant

The basic plant includes (see Fig. 1):

- ball shaped container for the reaction process, 10 l capacity (A)
- adapter cover with connection at centre, and two parallel side elements, completes with connecting flange (B)
- double scale thermometer, suitable for use both as a contact thermometer and as a thermometer to check the reaction temperature (C)
- condenser with coated coil, suitable for installation on the reaction set, for use as heat exchanger or distillate condenser, exchange surface area of 1900 cm² (D)
- ball shaped container for distillate recovery, 2 l capacity (E)
- calorific mantle for the reactor, 10 l - 2000 W (F)
- Thyristor regulator for high temperatures control (G)
- Thyristor regulator suitable for use as a control unit with contact thermometer (H)
- stainless steel stirrer with adjustable speed motor (I)
- head for distillation with thermometer (L)
- tap to empty out the reactor at end of the reaction process (M)
- cylinder shaped container to supply the unit, 10 l capacity (N)
- support frame of stainless steel

All the parts are made of borosilicate glass to be able to work with a wide variety of products and make the system more versatile for teaching purposes.

Optional vacuum production device (code 991110)

Makes it possible to create vacuum conditions in different parts of the system, to be able to work with heat-sensitive organic substances.

The device includes:

- Rotary vacuum pump, complete with accessories and lubrication oil (O)
- High-precision electronic vacuum control device (P)
- Separation trap between the vacuum control devices and the vacuum pump (Q)
- Manifold for vacuum distribution to the various parts of the column (R)

SAD/IC61D automatic data acquisition system

Makes it possible to acquire process data and the main parameters on a Personal Computer in real time, so as to take full advantage of the IC61D system for teaching purposes.

The electronic transducer and signal conditioning kit (code 914442) includes the electronic transducers for the acquisition of the following variables:

- reaction temperature T1
- reaction vapour temperature T2
- distillate temperature T3

These transducers are Pt100 thermo-resistances to be placed in different points of the system in lieu of the thermometers included in the basic version of the system.

The system performs the conditioning of the signals supplied by the thermo-resistances to adapt them to the A/D conversion board with USB interface.

The data acquisition and analysis software (code 914343) runs in the MS-Windows environment and makes it possible to acquire on a Personal Computer all the quantities considered during the tests, to process them and to produce diagrams for a thorough understanding of the process and the problems associated with plant operation. Furthermore, it makes it possible to save the data and diagrams obtained on a disk, or to print them out.

The SAD/C61D data acquisition system requires a Personal Computer with the following minimum characteristics:

- PC minimum Pentium with HD >10Gb, CD drive, SVGA graphic card minimum, mouse, 32MB RAM, USB port
- Windows XP or following
- Graphic printer

4. Experiments

The IC61D system makes it possible to perform a vast range of organic synthesis reactions, as well as the distillation of residues, which have not reacted. In particular, it is possible to perform:

- reactions between two reagents (e.g., nitriding, chlorination reactions, etc.);
- reactions between more than two reagents (e.g., production of methyl-benzhydrol);
- esterification reactions;
- saponification reactions.

5. Required Services

- Electrical power supply 220/240 V A.C. single-phase – 50/60 Hz – 3.5 kW
- Water supply: 500 l/h - 3 bar

- Water drainage

6. Weights and dimensions

- Dimensions: 1000 x 600 x 2000h mm
- Weight: 120 kg

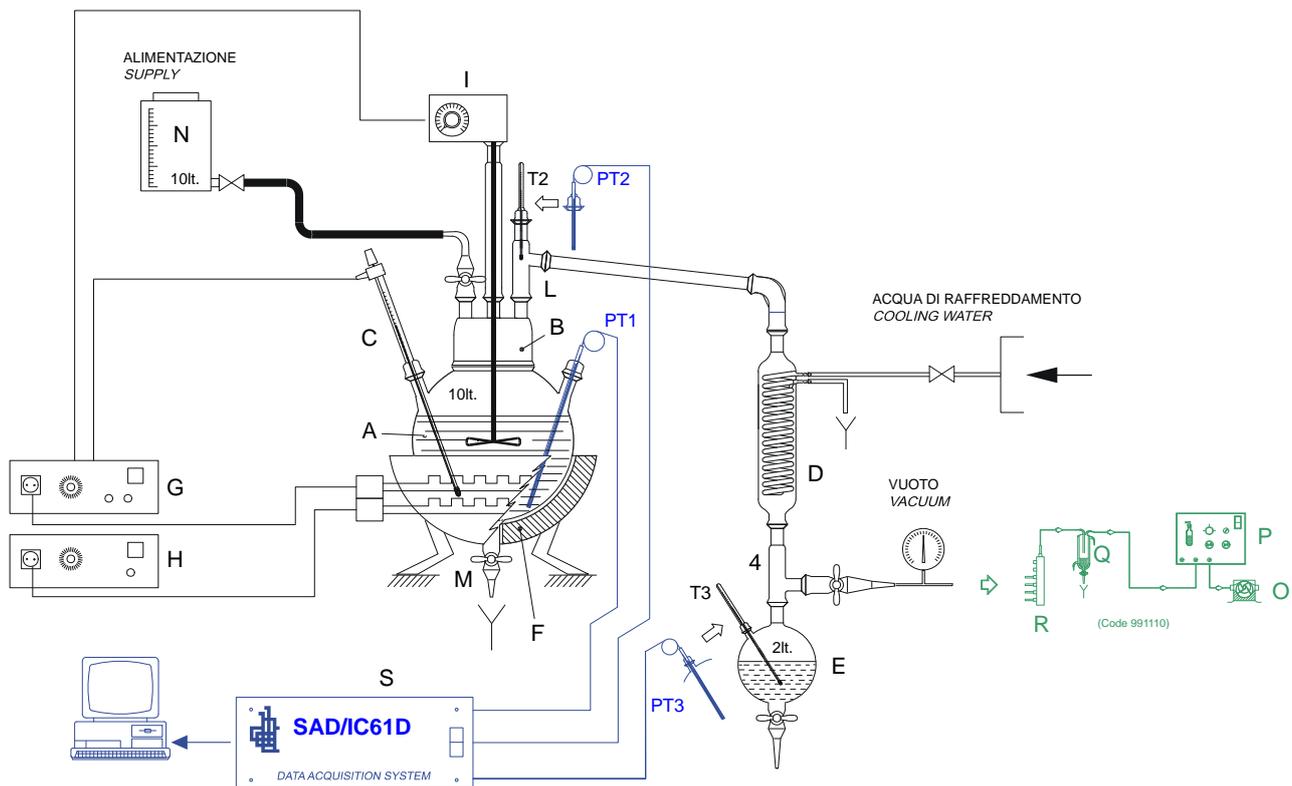


Fig. 1 – General synoptic

- A. Reactor
- B. Cover with connecting flange
- C. Thermometer with electric contact
- D. Condenser
- E. Distillate collection tank
- F. Heating mantle
- G. Temperature controller with contact thermometer
- H. Temperature controller
- I. Variable speed stirrer
- L. Distillation head
- M. Drainage
- N. Supply tank
- O. Vacuum pump
- P. Vacuum controller
- Q. Separation trap
- R. Distribution manifold
- S. SAD/IC61D - Automatic data acquisition system

PC Personal Computer (not included)