

Mobile Test Plant for Gas/ Liquid Reactions

System description:

The mobile test plant enables gas / liquid reactions (for example oxidation and hydrogenation) in the chemical and pharmaceutical industries to be investigated. These investigations are aimed at finding new applications in cooperation with the customer and, if necessary, directly on site. Applicable gases are e.g. oxygen, hydrogen, carbon monoxide and carbon dioxide.

The test plant is of a modular design:

- Storage vessel with feed pumps and gas metering
- Stirred reactor with external circuit
- Vessel for product removal and temperature control

It can be operated continuously, semi-continuously and discontinuously. The reactor and heat exchangers are heated and cooled via two temperature control units. The test plant is controlled via a process control system. The most important process data are recorded. A cryo-condensation facility for waste gas purification is provided as an option.

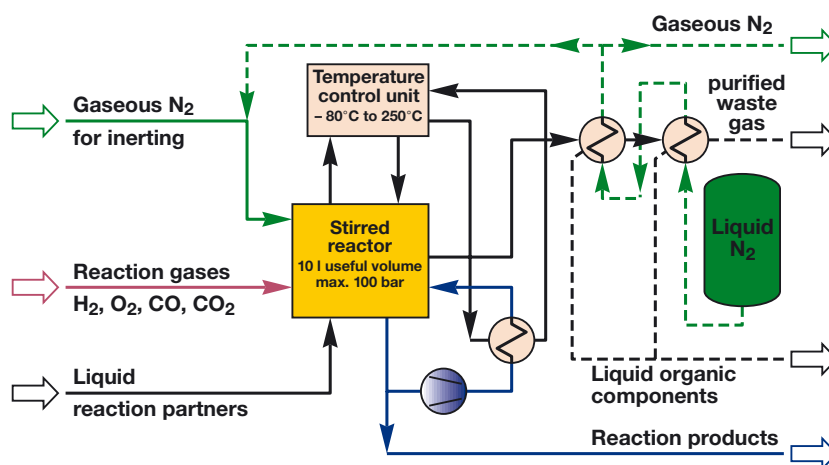


Figure 1: Basic flow diagram of the test plant

Areas of use:

The test plant is used to examine oxidation reactions, hydrogenation, reactions with carbon monoxide and with or in carbon dioxide, as well as for low-temperature synthesis. The influence of

- temperature
- residence time
- gas pressure and partial pressure
- gas distribution and
- mass transfer

on the turnover and selectivity of the reaction can be determined. It is also possible to investigate the kinetics of the reaction and to determine optimum impeller shapes and impeller arrangements.



Figure 2: Test plant with peripherals

Advantages:

- Can be used for a large number of gas / liquid reactions
- Wide ranges of temperatures and pressures can be tested
- Possibilities for examining blending (variation of gas distribution and impellers)
- Can be used on the customer's premises

Technical data:

- Reactor

| | |
|------------------|--|
| Maximum pressure | 100 bar |
| Temperature: | -80 °C to +250 °C |
| Volume: | 15 l |
| Useful volume: | 10 l |
| Fittings: | Gassing ring, gassing lance, cooling coil, filling level measurement, temperature measurement, impeller shaft for various impeller arrangement, inerting of chamber head |
- Pumps

| | |
|---------------------------------|--|
| Metering pump: | Max. back pressure: 100 bar Flow rate: 5 - 50 l/h |
| Circuit pump: | Flow rate: 5 - 50 l/h |
| Suction pressure stabilisation: | Max. back pressure 10 bar Flow rate: 70 l/h |
- Gas metering for oxygen and another reaction gas
- Pressure adjustment and inerting with nitrogen
- Oxygen analyser in the waste gas flow

Ranges of services:

Range of services for using industrial gases for gas / liquid reactions:

- Experimental investigations with the test plant
- Determining the kinetics and influence of mass transfer on the reaction
- Process-related calculations
- Economy observations
- Elaborating the complete process technology, equipment and construction.

The know-how of Linde Gas and of Linde Process Engineering and Contracting Division are available for dealing with projects.



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Additional printed material on the entire range of products and processes is available from all sales offices.

Our specialists are at your disposal to deal with any questions.