Reactors for catalyst testing

evaluation of

- quality and quantity
- selectivity
- yield
- transformation energy
- process kinetics

Büchi reactors are available in:

- borosilicate glass, stainless steel, Hastelloy
- different volumes (10 ml up to pilot scale)
- pressure ratings from 12 bar (glass reactor) up to 350 bar
- temperature ratings up to 350°C

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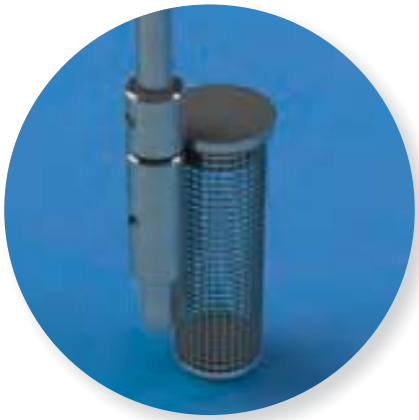
Reactors for catalyst testing

Fixed catalyst basket (case 1)



Application
Efficiency testing of catalyst

Process
Product oriented catalysis in the liquid phase

Procedure
Gas and/or liquid circulates through catalyst bed

Limitation
The catalysts activity is limited locally

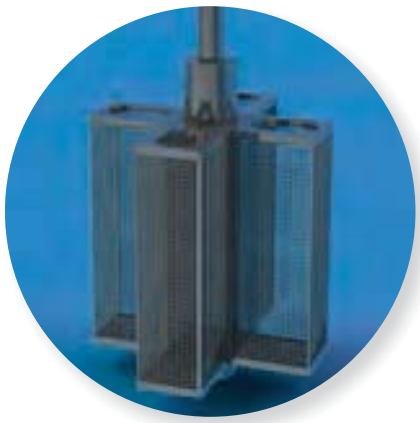
Spinning catalyst basket, serves as mixer (case 2)

Application
Efficiency testing of larger catalysts, pellets

Process
Product oriented catalysis in the liquid phase

Procedure
Gas and/or liquid circulates through spinning catalyst bed, basket acts as mixer, small volumes already get in contact with catalyst

Limitation
Room for built-in accessories likes probes etc. due to space constraint



Spinning or static catalyst basket (case 3 – Robinson-Mahoney principle)

Application
Efficiency testing of catalyst

Process
Product oriented catalysis in the liquid phase

Procedure
Gas and/or liquid circulates through spinning or stationary catalyst bed, basket acts as mixer, small volumes already get in contact with catalyst

Limitation
Room for built-in accessories likes probes etc. due to space constraint

Büchi catatest reactors are designed with fixed basket, spinning or falling basket for use with liquids, gases or solids. They can be used for catalyst testing, catalytic hydrogenations, oxydations etc. Catalyst testing is often done to test the efficiency of the different catalysts and/or to develop or improve the relevant processes. Different stirrers / baskets are available depending on process, the reactants phase conditions, viscosity, etc. They influence the area of interaction between catalyst and reactants (heterogeneous catalysis) where the reactants must diffuse to the catalyst surface and adsorb onto it. Specific transformations can take place (case 1 – 3). It also allows to precisely define the starting point of a reaction in order to observe specific kinetics or to do sequential gas / liquid phase reactions (case 4). For the addition of catalysts in solution / suspension, burettes can be used (case 5)

Falling and spinning catalyst basket (case 4)

Application
Kinetics behavior testing of catalytic reaction

Process
Control of the kinetic of catalytic reaction in the liquid phase

Procedure
Operator determines start of the catalytic reaction, possibility to observe specific kinetic by:

a) Falling spinning catalyst basket into liquid phase, after reaction mixture having reached its reaction condition rotating or spinning basket acts as mixer, small volumes already get in contact with

b) By addition of liquid/suspension (from burette) at a specific moment , after being prepared outside the reactor, mixing by built-in stirrer, stationary or spinning basket

Limitation
Mesh size of catalyst basket

Burettes (case 5)

Addition of catalysts in solution / suspension by (heatable) burettes.

Examples

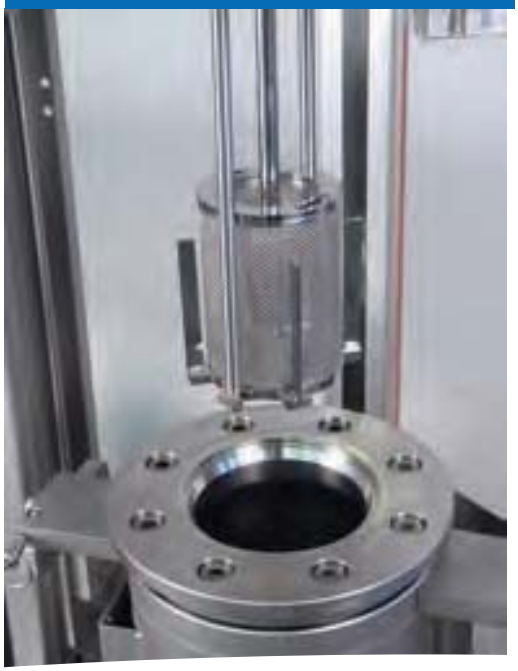
Spinning catalyst basket for 300ml / 350 bar reactor

Double fixed catalyst basket with increased interaction surface for 200ml / 10 bar glass reactor

Fixed catalyst basket and turbine stirrer with gassing stirrer shaft for 1 liter / 60 bar reactor

Spinning catalyst basket for 3 liters / 200 bar reactor

Static catalyst basket for 2 liters, 60 bar reactor (Robinson Mahoney principle)



15 bar burette mounted on 3 liters pressure vessel

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