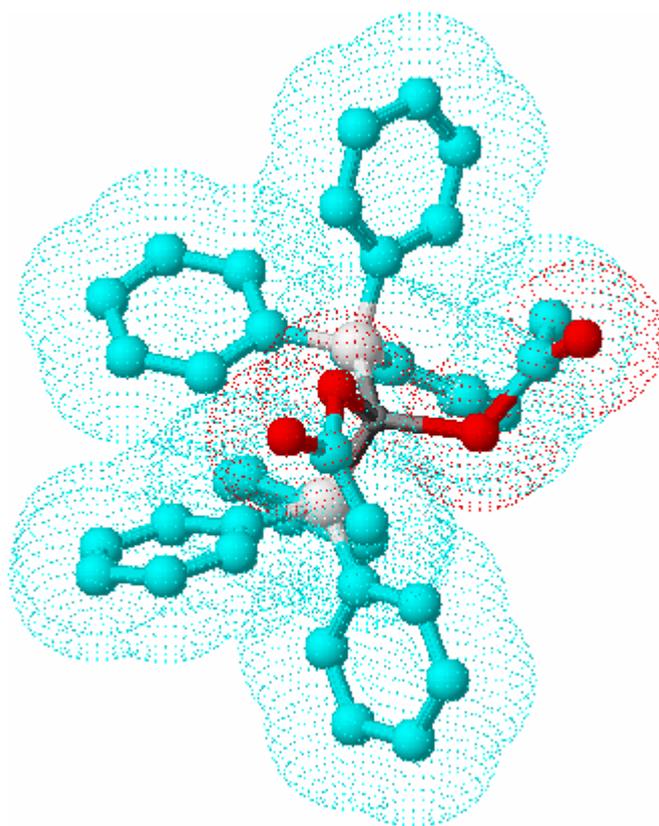


AraChem

Catalytic



Bis(triphenylphosphine)Palladium(II) diacetate

Contract Research & Custom Synthesis

www.arachem.nl

AraChem-Catalytic is a division of AraChem Contract Research & Custom Synthesis.

Our experience in the field of organic synthesis and catalysis, backed up by the large expertise of the members of our scientific board/network, allow us to respond and satisfy consistently your specific requirements. We offer dedicated customer-oriented services on an exclusive basis.

AraChem-Catalytic offers solid expertise and services in the catalytic field and is committed to confidentiality, reliability and delivery of quality products.

✓ **Homogeneous Catalysis**

- Design / Synthesis of ligands (organometallic chemistry)
- Catalyst preparation and immobilisation of homogeneous catalysts (Contract Manufacturing)
- Characterisation and evaluation of catalyst performance (turnover, selectivity)
- Full monitoring of the catalytic reaction and optimization of the parameters of the catalytic process

✓ **Heterogeneous Catalysis**

- Catalyst screening based on commercially available catalysts (noble/based metal catalysts, zeolite...)
- Evaluation of promoter effect on the catalyst performance
- Characterization of catalysts
- Full monitoring of the catalytic reaction and optimization of the parameters of the catalytic process

Below is presented one of the catalytic test reactors used for the screening study of heterogeneous catalysts.



Reactor:

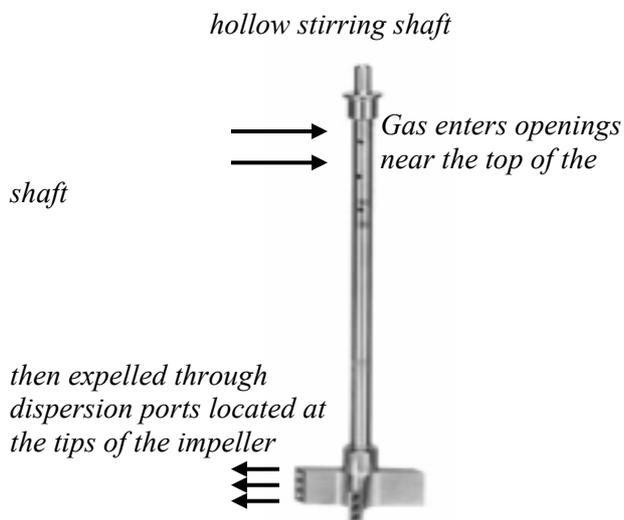
T316 stainless steel Fixed Head stirred reactor, Model 4567, from Parr instrument Company, Illinois-USA with a programmable controller Model 4843.

The reactor has a capacity of 450mL and is equipped with a pressure transducer, a tachometer (to control stirring speed up to 1500 rpm), a temperature controller, a cooling coil, a liquid sampling valve to take samples at desired interval of time and a stirrer with gas entrainment technology to insure maximum gas dispersion into a liquid system,.

Max Pressure: 3000 psi (200bar)

Max Temperature: 350 °C

The gas entrainment impeller is designed to obtain maximum gas dispersion into a liquid system. This is obtained with a unique impeller attached to a hollow stirring shaft through which gases are continuously re-circulated from the head space above the liquid to the impeller.



Gas enters openings near the top of the shaft and is expelled through dispersion ports located at the tips of the impellers. As with all impellers, the speed of the stirrer (800 – 1200 rpm) creates a vacuum at the tip of the impeller. In this system with dispersion ports located at the very tips of the impellers, the higher the stirring speed - the higher the vacuum - and the higher the driving force for this very effective gas dispersion system.

The reactor can also be equipped with a static design catalyst basket for easy screening of heterogeneous catalysts under conditions comparable to fixed bed reactor.

In the static design the mesh basket holding the catalyst remains stationary while impellers on the stirring shaft and baffles outside of the basket direct the flow of reactants over the surface of the contained catalyst. A unique gas entrainment impeller provides a uniform flow of both gas and liquid over the fixed catalyst bed held within the annular basket.



The catalyst is loaded in a basket to protect it from grinding during operation. The specially designed stirrer combines radial flow and gas entrainment technology to provide an improved mixed gas and liquid flow through the catalyst bed. Thus, the three-phase mixing produced is comparable to the conditions in a fixed-bed reactor and allows an easy screening of the catalysts.



When a catalyst with the desired activity is identified from the screening study with help of the catalytic basket, its performance is then validated in a fixed bed reactor.

The fixed bed experiment can be carried out at AraChem laboratories, or in collaboration with Delft University of Technology – the Netherlands. Dimension and Operating conditions of the presented fixed bed (see foto):

i.d:40mm h:2m, Feed tank: 50L

Max Pressure:60 bar, Max Temperature: 250 °C

Catalysts characterisation

AraChem can carry out catalyst characterisation in house and/or in collaboration with Delft University of Technology – the Netherlands. This is a list of the routine-based analyses that can be performed by AraChem. For details and/or other techniques, please send your e-mail to info@arachem.nl

✓ **Porosity**

- N₂ Physical Gas Adsorption at 77 K (Volumetric Technique)
- Ar Low Pressure Physical Gas Adsorption at 87 K (Volumetric Technique)
- CO₂ Physical Gas Adsorption at 273 K (Volumetric Technique)
- Kr Physical Gas Adsorption at 77 K (Volumetric Technique)
- H₂ or CO Chemical Gas Adsorption (Volumetric Technique)
- Mercury Intrusion Porosimetry
- He Pycnometry

✓ **Sizing**

- Laser diffraction (dry, aqueous or organic fluid dispersion)
- Image Analysis
- Photon Correlation Spectroscopy (PCS).
- Phase Doppler Velocimetry.
- Electron Microscopy.
- Gravitational Sedimentation.
- Electrical Sensing Zone
- Sieve Analysis.

✓ **Composition**

- Microwave Spectrometry
- FT-IR Spectroscopy
- Mass Spectrometry.
- ICP Analysis.
- X-Ray Fluorescence (XRF).
- Thermogravimetry.
- Differential Scanning Calorimetric (DSC)

Please direct your inquiries to

AraChem

Contract Research & Custom Synthesis
P.O. Box 2021, 6020 AA Budel, the Netherlands
Phone : +31 495518061, Fax : +31 495518920
E-mail : request@arachem.nl, www.arachem.nl

Advisory Board

Prof. Dr. Ir. H. Van Bekkum (Delft University of Technology- the Netherlands)
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