

## Kinetics of **Homogeneous Hydrogenations:** **Measurement and Interpretation**

*Excerpts from an article by*

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### **Monitoring of Hydrogenations via Hydrogen Consumption**

One method, which is still used frequently to follow hydrogenations *in situ*, is the registration of hydrogen consumption. There is a multitude of solutions that can be simply subdivided into normal-pressure and high-pressure measurements...

... By contrast, the measurement of the hydrogen consumption under normal pressure is relatively simple. The elementary structure of many such measuring devices is similar, and is based principally on the fact that the pressure drop is balanced by reduction in the reaction volume or by supply of the consumed gas, thus ensuring isobaric conditions. An appropriate device for monitoring major gas consumptions ...

... hydrogenations under normal pressure and isobaric conditions, we use a device which registers gas consumption automatically (Fig. 10.3). Possible error sources resulting from such gas consumption measurements and possibilities of their minimization will be discussed.

The basic principle to realize isobaric conditions for the hydrogenation apparatus is to change the volume of the closed reaction space via a (not commercially available) gas-tight syringe in order to ensure a permanent atmospheric pressure as the reference. For this purpose, a sensible pressure sensor registers the pressure drop caused by hydrogen consumption in the closed reaction system. Using a processor-controlled stepping motor axis, the piston of the syringe is depressed until the initial pressure is reached. At this point the position of the piston is registered as a function of time and finally visualized as the hydrogenation curve. (The same arrangement also allows the automatic registration of gas formation.) ...