**Autoclave for synthesis, catalysts testing and kinetic measurements**

**Equipment:** Autoclavefor synthesis, catalysts testing and kinetic measurements

**No. of Equipment: UFCH3**

**Responsible coordinator:** Dr. Petr Sazama

**Name of Institution:** J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i.

**Address of Institution:** Dolejškova 2155/3, 182 23 Prague 8, Czech Republic,

**E-mail:** [petr.sazama@jh-inst.cas.cz](mailto:petr.sazama@jh-inst.cas.cz)

**Telephone:** +420 26605 3325

**Homepage:** http://www.jh-inst.cas.cz

**Contact person:** Dr. Petr Sazama

**E-mail:** [petr.sazama@jh-inst.cas.cz](mailto:petr.sazama@jh-inst.cas.cz)

**Telephone:** +420 26605 3325

**Equipment Description**

**Description of equipment:**

Set of three autoclaves equipped for liquid phase bath synthesis, catalysts testing and kinetic measurements.

Specifications and technical features:

Stirring and heating/cooling control

Inert or controlled environment inside the reactors

Liquid and/or gaseous reagents addition under the pressure

Sampling unit

Handling of slurries and suspensions

*Autoclave 2.*

Volume: 0.55 l

Temperature range: 20 – 220 °C

Pressure range: 0 – 150 bar

Hastelloy C22

**Specification of expertise relevant to NanoEnviCz workpackages:**

**WP3**a,d,f,g, **WP4a-**c **WP5a-**c, **WP6**a,e, **WP7**a,g, **WP9**a,b

**Detailed description of expertise**

**Please, specify the main research topics connected with equipment**:

**Synthesis of materials for heterogeneous catalysis**

Zeolites (H-zeolites and M/M-oxo zeolites of various structural topologies)

Carbon (3D carbon structures)

Metal/Metal-oxo (Spinels, Perovskites, Supported catalysts M/M-oxo on ZrO2/Al2O3/SiO2)

Nanofibers (WOx/ZrO2, CeO2/ZrO2, TiO2)

**Please, specify the secondary research topics connected with equipment**:

**Catalytic processes**

Redox-catalysed reactions (NH3-SCR-NOx, CxHy-SCR-NO, deN2O, selective oxidation)

Acid-catalysed reactions for petrochemicals and refinery (Isomerization C5-C7, Cracking of paraffins and olefins, Alkylation of aromatics , MTH)

**Controlling catalytic properties**

Mass transport (Micro-mesoporous structure, Channel size and connectivity)

Acid sites (Concentration and strength of Brønsted sites, Spacious arrangement, Concentration and nature of Lewis sites, Level of structural defectivity)

Redox centres (Oxidation state, Nuclearity, Coordination, Reducibility, Spacious arrangement)

**Keywords describing research area:**

Synthesis on nanomaterials, Heterogeneous catalysis, Catalytic processes

**Competence**

**Relevance for applied and industrial research:**

Flexible, reproducible synthesis of advanced compounds and materials for research in the field of heterogeneous catalysis.

Versatile kinetic measurements for which numerous accessories for different types of reactions are available. Possibilities for screening and kinetic testing of heterogeneously catalysed reactions.

Exploitation of f**undamental understanding** of materials structure/activity for novel synthesis and large scale production of catalysts.

**Relevance for fundamental studies:**

Studying kinetics of heterogeneously catalysed reactions.

Synthesis of catalysts with structure tailored on a molecular level.

Analysis of the relationships between structural properties on the molecular level and catalytic activity.