**Laboratory reactors**

**Equipment: Laboratory reactors**

 **(included in the Laboratory for Synthesis and Testing of Sorbents)**

**No. of Equipment: UJEP12**

**Responsible coordinator:** Prof. Ing. Pavel Janoš, CSc.

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**Equipment Description**

**Description of equipment:**

Laboratory – scale reactors for preparing metal oxide-based sorbents and related materials by homogeneous hydrolysis, sol-gel process, precipitation/calcination and similar techniques. Equipment for their functional testing.

**Specifications and technical features:**

5 – 10 L laboratory reactors with propeller and temperature control for preparations of (nano)sorbents

Laboratory-scale reactors and related devices for equilibrium and kinetic sorption experiments

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

**WP3**e,f **WP4**a, **WP5**c, **WP6**a,b,e, **WP7**a-d,f,i

**Detailed description of expertise**

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

Development of new (nano)materials for liquid-phase adsorption removal of diverse pollutants from waters. Study of the sorption mechanisms and kinetics.

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

Application of specifically designed (nano)materials for destruction of highly toxic compounds, e.g. organophosphates (pesticides, chemical warfare agents). Study of the reaction mechanisms and kinetics. Study of the interactions of (nano)materials with some biologically relevant organophosphate compounds.

**Keywords describing research area:**

Liquid-phase adsorption; Reactive sorption; Degradation of toxic compounds

**Competence**

**Relevance for applied and industrial research:**

**Functional testing of sorbents**

Complete characterization (in cooperation with partners) and functional testing of (nano)materials for liquid-phase adsorption and reactive sorption towards pre-determined model compounds (heavy metals, inorganic ions and oxoanions, synthetic dyes, polar and non-polar aromatics, …) or customer-specified pollutants, study of the sorption mechanisms, determination of sorption characteristics (capacity, selectivity, parameters of sorption isotherms, kinetic parameters)

**Reactive sorption testing**

Study of the degradation of highly toxic compounds on specifically designed (nano)materials by the mechanisms of reactive sorption. Testing of the degradation kinetics and efficiency towards selected model compounds (e.g. organophosphate pesticides). On a special request, the decontamination study with real chemical warfare agents (soman, VX agent, sulphur mustard) may be performed in cooperation with partners.

**Relevance for fundamental studies:**

Studying the mechanisms and kinetics of liquid-phase adsorption and reactive sorption