**Reactor Speedwave four**

**Equipment:** *Speedwave four*for synthesis of nanomaterials

**No. of Equipment:UFCH12**

**Responsible coordinator:** Ing.Jiří Rathouský CSc.

**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:** jiri.rathousky@jh-inst.cas.cz

**Telephone:** +420 26605 3945

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

**Contact person:** Radek Zouzelka, M.Sc.

**E-mail:** radek.zouzelka@jh-inst.cas.cz

**Telephone:** +420 26605 3945

**Equipment Description**

**Description of equipment:**

Microwave digestion system with built-in, non-contact temperature and pressure measurements.

The *speedwave* microwave digestion system has been designed to perform chemical digestion procedures under extreme pressure and temperature conditions in chemical laboratories. Digestion is understood to mean the decomposition of a solid material by means of a suitable digestion reagent at increased temperature in a vessel that is permeable with regard to microwaves. The digestion solutions are directly heated through the absorption of the microwaves radiation by the polar digestion, which generally also contains ionic components.

Digestion reagents used include nitric acid (65%), hydrochloric acid, hydrofluoric acid, phosphoric acid, and sulphuric acid, as well as mixtures of these acids. The use of organic solvents is strictly prohibited in microwaves since the spontaneous combustion of any solvent vapours that escape into the oven chamber cannot be precluded.

Specifications and technical features:

Temperature/Pressure control

Gas collection system

Quartz/TFM vessels

Microwave power: 1,450 W

Magnetron frequency: 2450 MHz

Temperature range: 20 –230 °C (short term-up to 300 °C)

Pressure range: 0 – 130 bar

Volume range of 1 pressure vessel: 17-100 ml

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

**WP3**a,d-g **WP4**a,b **WP5**a, **WP6**a,b,d,e, **WP7**a,b,h, **WP8**a,c, **WP9**a,b,c

**Detailed description of expertise**

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

Rapid preparation of inorganic nanostructures:

noble metals (Au, Ag, Pt)

metal oxides (Zno, TiO2, SiO2)

composites (Au/Pd, Al/Cu, Fe/graphene)

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

**Catalytic processes**

Synthesis of micro/mesoporous zeolites with well-defined structure and texture properties

Catalyst preparation to solid-state synthesis

Easy access to high molecular weight polymers

**Keywords describing research area:**

synthesis of nanomaterials and composites, heterogeneous catalysis, polymers

**Competence**

**Relevance for applied and industrial research:**

Rapid and reproducible synthesis of nanomaterials with unique morphologies and phases for research in the field of nanotechnology.

Access to novel reaction pathways with lower polydispersity of materials.

Solid state synthesis of composites for applications in the large field of nanotechnology of current research and development

**Relevance for fundamental studies:**

Studying texture and structure properties of materials

Analysis of catalytic and photocatalytic activity

**Comments**

Temperatures ˃280 °C such as occasionally occur during the course of exothermic reactions can result in irreversible damage to the Teflon vessels. Damage of this kind as well as glass damage during the handling are excluded from the warranty.