

## Pressure Digestion System DAS

**A system for the simultaneous digestion of up to 32 solid samples with acids**  
(including a device for the evaporation and neutralisation of the acids).

### Fields of use and mode of operation

The **PicoTrace** DAS-system allows the digestion of rocks, soils, sludge, filtration dusts and almost all other solid materials in concentrated acids and mixtures of acids without contamination. It operates under pressure and at temperatures of up to 200°C. Using HClO<sub>4</sub>, organic material will be completely oxidized. In the clear, residue-free digestion solutions all elements can be analyzed which form no volatile compounds with the acids used.

The digestion occurs in two steps: During the **pressure phase** the solid material will be decomposed, during the **evaporation phase** the material is transformed into soluble salts (perchlorates, nitrates, chlorides). The resulting solutions will be diluted to appropriate concentrations for analysis.

Acid vapors, liberated during the evaporation are passed through wash bottles, where they are neutralized. The laboratory air passing through the system is thoroughly filtered to avoid contamination of the samples. Using acids, which were prepared with the **PicoTrace** Subboiling-Cupola distillation apparatus, the concentrations of elements in blank samples are within the limits of detection of ICP-MS analysis. The system has been successfully used in **isotope dilution analysis**.

The system is available for the simultaneous digestion of 16 or 32 samples with a maximum of 30 ml per vessel or 12 or 24 samples with a maximum of 100 ml per vessel, resp.

### For example - the 16-samples unit consists of:

#### **(for both, the pressure and evaporation phases)**

- digestion block for 16 samples
- 16 TFM digestion vessels; the inner surfaces are compressed and polished
- Safety hot plate **SFH 5030 HD** with the **TR 1040** programmable time/temperature controller. The hot plate can be used for two digestion blocks
- 6 specially designed bolts, to fix a pressure plate to the digestion block

#### **(for the pressure phase only)**

- 16 TFM lids with a condensation cupola, compressed and polished
- 16 additional pressure lids for closing of the digestion vessels during the pressure phase
- pressure plate with 16 screws
- device for the rapid cooling of the digestion block

#### **(for the evaporation phase)**

- PTFE-evaporation plate covering 16 digestion vessels, provided with openings for the addition of air and the removal of acid vapors; adapters for the acid tubing and the air filters, pressure plate
- Device for the neutralization of the acids
- Aspirator or (on special request) membrane pump

#### **(preparatory to the digestion process)**

- Holders for 16 digestion vessels made of Plexiglas
- PTFE - support for the digestion vessels during weighing

**A second set of digestion vessels with lids and an additional holder should be available.**

All vessels and lines of the digestion system which come in contact with acid, are made of ultrapure PTFE or TFM. The outer surfaces, which may come in contact with acid are either made of PTFE or TFM or of an AlMg-alloy coated with PFA. All screws are made of stainless steel and/or titanium. They are in use only when the digestion vessels are closed. To reduce memory effects, the inner walls of the vessels and the lids as well as parts of the evaporation plate are compressed and polished.

### **Advantages of the Pressure Digestion System DAS**

- Especially designed for use in ultra-trace element and isotope analysis
- High safety standard through
  - the use of **PicoTrace** safety hot plate (**SFH 5030 HD**) and time/temperature-controller **TR 1040**
  - built-in breakaway guarding against overpressure
  - neutralization of the acid vapors at their point of exit
- High effectiveness through the simultaneous digestion of 16 or 32 samples with a maximum of 30 ml per vessel or 12 or 24 samples with a maximum of 100 ml per vessel
- Reduction of corrosion in the lab through evaporation of the acids in a closed system and, related to it, reduced contamination of blank samples
- A special fluoric acid - perchloric acid fume hood is unnecessary resulting in
  - low investment and
  - low running expenditures
- Long lasting digestion vessels
- Extremely low values in blank samples
- Extreme low memory effects, reducing cleaning time
- Working temperatures up to 200°C
- Suitable for all acid mixtures including those with HClO<sub>4</sub> and H<sub>2</sub>SO<sub>4</sub>
- Low expenditure of chemicals
- Well controlled evaporation time
- Optimal performance during serial analyses
- Easy handling, therefore also suitable for student laboratories

### **Technical data:**

<b>Needed minimum space:</b>	<b>70 x 90 to 120 cm</b>
<b>Height of the device (including hot plate):</b>	<b>45 cm</b>
<b>Optimal height of the working area:</b>	<b>65 to 75 cm from ground</b>
<b>Weight:</b>	<b>approx. 50 kg ( 32 samples 30 ml) and approx. 35 kg ( 16 samples 30 ml)</b>
<b>Public utilities required:</b>	
<b>Water for cooling and the operation of the aspirator</b>	
<b>Current (220-250 V, 16 A) for the hot plate.</b>	

**The system should be positioned on a working bench not higher than 75 cm.**