

DJ-500 Desorption Unit



The DJ-500 desorption unit is used for tritiated water desorption which is trapped in Silica gel or another sorbent.

This allows follow-up analysis of the liquid sample in the laboratory using liquid scintillation counting method.

Purpose

The DJ-500 desorption unit belongs to the set devices used primarily for sampling and monitoring of tritium and carbon-14 in gaseous effluents from nuclear facilities.

It is used for desorption of tritiated water (H_2O containing 3H) which is trapped in sorbent. The basic model of DJ-500 (K0223) is designed for desorption from Silica gel, the modified model (K1343) can be used for desorption from other sorbents, e.g. from Molecular Sieve.

Subsequently, to detect and analyse the tritium contained in the trapped water, a liquid scintillation method (LSC) is applied.

Description

The DJ-500 desorption unit consists of the following parts:

- Heating module (sorbent drying tank in heating box)
- Cooling module (cooling tank in cooling medium box)
- Vacuum pump
- Controller

During preparation for the desorption process, Silica gel (or another sorbent) is placed into the drying tank. A cooling medium – solid CO_2 , i.e. "dry ice", or liquefied nitrogen – is put into the cooling box in the area surrounding the cooling tank, and the tank is covered with a lid.

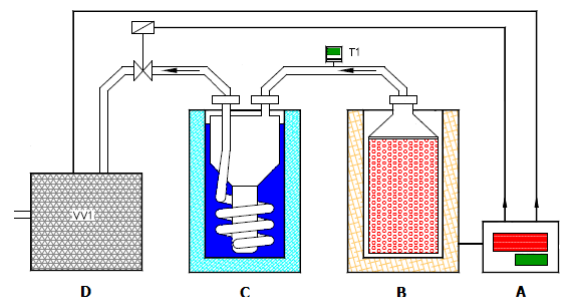
After preparation of the drying and cooling tanks, the air route is closed with the quick-acting couples.

Due to negative pressure, high desorption efficiency can be even achieved with lower temperatures (about $150\text{ }^{\circ}C$ / $302\text{ }^{\circ}F$) and Silica gel may be reused for sorption and desorption; certain conditions must be met.

DJ-500 is processor-controlled unit and the complete desorption process is fully automated.

Main Advantages

- Unique combination of high temperature and negative pressure secures a very high desorption efficiency
- Possibility to re-use Silica gel for sampling
- Adjustable automated process

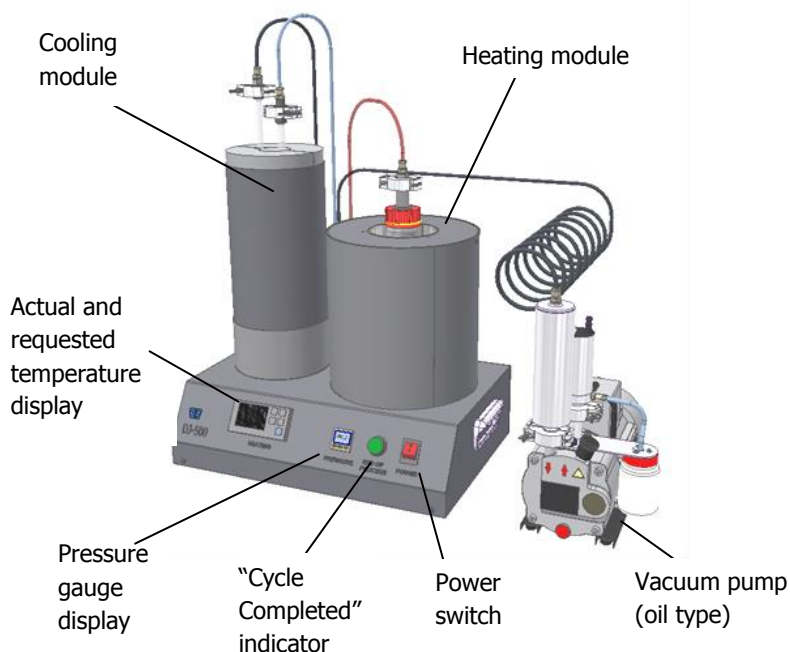


DJ-500 Block Diagram

- A Heating controller*
- B Heating module*
- C Cooling module*
- D Vacuum pump*

Description

DJ-500 Main parts



Desorption process

The particular desorption steps are as follows:

- When sorbent is in the drying tank and cooling medium in the cooling tank, after switching on the power, the desorption unit will begin to heat the tank and the vacuum pump will operate.
- The temperatures – actual and requested – are indicated on the display. The negative pressure value is indicated on pressure gauge display. The air duct tightness is indicated by a coloured light.
- Within 20 minutes the operating temperature in the drying tank is reached. (Pre-set at 150 °C, i.e. for Silica gel.)
- The process of desorption is now in progress (pre-set for 240 minutes, for Silica gel). Desorption negative pressure achieves a value within -90 to -98 kPa (-675 to -735 mmHg).
- After the desorption process is completed, the green "CYCLE COMPLETED" LED will light up and the acoustic signal will sound.
- Frozen desorbed water is captured in the cooling tank in the cooling module. The cooling tank may be withdrawn and after natural tempering (dissolved ice) the liquid sample is ready for analytical examination.



Specification

Desorption cycle	adjustable, pre-set 240 min.
Maximum desorption temperature	according to type 150 °C or 500 °C (302 °F or 932 °F)
Maximum desorption negative pressure	-99.9 kPa
Silica gel desorption efficiency (at pre-set conditions)	> 99%
Sorbent tank volume	1 dm ³ (61 in ³)
Cooling medium volume (CO ₂)	1 dm ³ (61 in ³)
Amount of water captured at declared conditions	max. 50 g
Dimensions (W x L x H)	445 x 300 x 700 mm (17½ x 11¾ x 27½ in)
Weight	app. 15 kg (33 lb)
Power supply	230 VAC, 50 Hz
Maximum power input	1000 VA
Operational conditions:	
▪ Ambient temperature	+10 ~ 35 °C (50 ~ 95 °F)
▪ Atmospheric pressure	86 ~ 106 kPa (645 ~ 795 mmHg)
▪ Relative humidity	max. 80 %

Models and Accessories

Type	Description
K0223	Desorption Unit DJ-500 (process temperature max. 150 °C)
K1343	Desorption Unit DJ-500 (process temperature max. 500 °C)
Related products	
K0220-XX	V3H14C Differential Tritium and Carbon-14 Sampler; V3H14Ca Tritium and Carbon-14 Sampler (more models)
K0221-XX	V3H Differential Tritium Sampler; V3Ha Tritium Sampler (more models)

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