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Brief 70-10449

NASA TECH BRIEF

Sorption Vacuum Trap

The problem:

To develop a sorption trap for use with high-vacuum systems. Molecular-sieve traps fabricated of 304-stainless steel with the sieve contained in stainless steel trays or wire cages are presently used in commercial practice. An external heating mantle provides a means of heating the trap for bakeout and for the regeneration of the molecular-sieve material at a temperature of 350° to 450°C.

The solution:

A modified sorption trap that can be used in high-vacuum systems, and which contains provisions for online regeneration of the sorbent material. The trap is so constructed that it has a number of encapsulated resistance heaters and a valving and pumping device for removing the gases from the heated sorbing material. This sorption trap provides a method for eliminating excessive downtime.

How it's done:

The external heating mantle used in normal practice has the following disadvantages: (1) it is difficult to obtain heating mantles for sorption traps larger than 10 in. in diameter; (2) it is inefficient; and (3) because heat is conducted to the flanges of the trap, metal gaskets must be used. Although less expensive elastomeric gaskets, which are also easier to replace, could be used in lieu of metal ones, they cannot be subjected to temperatures in excess of 100°C for prolonged periods.

An internal heating coil is feasible for use in a vacuum system, but its usefulness is marginal because of problems in electrical insulation; replacement of such a coil necessitates a major shutdown of the system.

These problems can be overcome, however, by mounting the wire cage containing the molecular sieve on the supports of a flange that has a conventional chevron baffle; an optical baffle is also included. Both the flange and chevron baffle can be cooled with water. A number of vacuum-tight stainless steel tubes, typically 5/8 in. in diameter, are placed on the lower trap flange. A thermometer can be mounted on one of these tubes for thermostatic control. Immersion heaters, normally 1/2 in. in diameter, 12 in. long, and having a 700 W capacity, are inserted from outside the vacuum system. A sorption trap with a diameter of 10 in. requires 5 such heating units. This heating unit is the most efficient available, and it can be replaced easily in a high-vacuum system.

Note:

No further documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Headquarters
National Aeronautics
and Space Administration
Washington, D.C. 20546
Reference: B70-10449

Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,469,375) and royalty-free license rights will be granted for its commercial development. Inquiries about obtaining a license should be addressed to NASA, Code GP, Washington, D.C. 20546.

Source: Anthony J. Caruso and Alfred E. Barrington
Electronics Research Center
(ERC-90051)

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