Description

The invention relates to a device for branching gas flows, especially in a chromatography plant, having an inlet branch connected to the output of a separating column and two outlet branches which extend from a junction to subsequent parts of the plant.

Gas flow diverters for gas chromatography are known, which are disposed in the flow path between two or more chromatography separating columns and enble the flow from a separating column to go at choice to one or more subsequent separating columns or to a detector. In the known systems of this kind the flow direction is diverted by the presence of auxiliary flow paths by means of which a positive pressure is produced in the particular branches it is required to close. The principle of this flow diversion is described in German Patent 1 811 860. Flow diverters based on the same principle are known, for example, from German Patent Specifications Nos. 2 806 123, 2 655 387 and 2 840 612.

A main purpose of all these known systems is to be able to divert the flow direction without the gas flow being controlled coming into contact with valves. These gas flows usually contain constituents which may be deposited in the valves. This may lead on the one hand to the valves becoming unserviceable and on the other hand to the original gas flow composition becoming altered and thus falsifying the quantitative determination of the substances present in the gas flow. Some of the known systems also deal with the problem of simplifying the relatively complicated valve systems made necessary by the use of auxiliary flows. Nevertheless, all of the known systems have disadvantages. For example, impurities are introduced into the system by the auxiliary flows. Another disadvantage is that the flow dividers are of fairly complex construction and a considerable expenditure on valves and valve controls is still necessary.

It is the object of the invention to simplify considerably the branching of gas flows.

This is achieved according to the invention in that, in a device of the kind hereinbefore set out, one outlet branch is connected by way of a shutoff valve to means producing a pressure lower than the pressure in the other outlet branch.

An embodiment of the invention will be described with reference to the accompanying drawings.

Fig. 1: shows a diagrammatic view of a junction in one operative position.

Fig. 2: shows the junction in the other operative position.

Fig. 3: shows a section through the embodiment of the interceptor.

As will be apparent from Figure 1, a gas chromatography separating column 1 has an outlet 2 connected to an inlet branch 3 of a flow divider 4 as is conventionally used today for capillary columns.

The flow divider is made of glass and of a quartz glass known under the commercial name "Fused Silica". The separating columns are also made of these two materials. The same chemical inertia is therefore achieved, so that all the substances which pass through the separating column without decomposition reach the interceptor intact. Also, since the cross-section in the two flow branches can be chosen freely, any loss of separating ability is prevented. The scavenging gas flow which is introduced also sustains the flow velocity in the capillaries, which has a positive effect not only on inertia, but also on the separating ability.

One outlet branch 5 is connected to a detector 7 from which the gas issues under atmospheric pressure. The detector is operative in a conventional manner for observation of the components present in the gas flow.

The second outlet branch 6 extends to an interceptor 8 mainly comprising a series of adsorption or absorption tubes 9 which can be introduced alternately into the gas flow. The interceptor 8 will be described in greater detail hereinafter. The interceptor output is connected by way of a shutoff valve 10 to a vacuum. The shutoff valve 10 is a simple on-off valve, in the present case a inch valve for flexible tubes.

A scavenging gas feed 11, which extends into the outlet branch 6, is provided on the input side of the interceptor.

In the state shown in Figure 1 the valve 10 is closed, i.e. the interceptor 8 and the outlet branch 6 are isolated from the

vacuum. Consequently, the gas flow emanating from the separating column cannot reach the outlet breanch 6 but flows to the detector 7. Also, a weak scavenging gas flow is fed into the outlet branch 6 through the scavenging gas inlet 11, flows to the flow divider and is combined therein with the main flow. This weak flow of scavenging gas ensures that the substances flowing from the column in the direction of the detector cannot diffuse into the interceptor and contaminate the system therein.

When a substance required to be intercepted, i.e. a so-called GC peak, has reached the end of the column, the device is changed over to the state shown in Figure 2. This is effected by opening the valve 10. The opening of the valve produces in the outlet branch 6 a pressure which is lower than the pressure in the outlet branch 5 and which diverts the gas flow through the branch 6 to the interceptor.

Moreover, the pressure difference in the two outlet branches can be controlled by the extent to which the valve is opened, so that the sample flow can be supplied wholly or partly to the interceptor. Consequently, some of the flow can also be fed via the detector for observation even after the diversion.

The interceptor 8 is shown in section in Fig. 3. It is mainly a mechanical device which comprises the requisite number of adsorption tubes, up to 10 in the present embodiment, in an arrangement distributed uniformly along a cylindrical surface and a drive for moving a required individual tube into the flow path. In the present embodiment the drive in pnuematic.

The tubes 9 are retained in a rotating drum 14 by appropriate retaining means 12, 13. The drum 14 has as many normal positions as there are tubes present. In each normal position a tube is present in the gas flow which comes from the connecting line to the flow divider, i.e. the outlet branch 6, and flows towards the vacuum by way of a connection 15 and the valve 10.

In order to change the tubes, a pneumatic device comprising a piston 16 and a compressed air supply line 17 raises the drum 14 and so rotates it that a different tube moves into the gas flow. A mechanical click stop system ensures accurate location of the tubes.

By the alternate introduction of the adsorption tubes into the gas flow the advantage of the diverter is fully used without

valve combinations and without auxiliary flows to change over the flow directions.

As the embodiment shows, the device according to the invention is of much simpler construction than known devices for the same purpose. In particular, a flow divider of very simple construction can be used. This has advantages both from the point of view of manufacturing costs and reliability of operation.

Claims

1. A device for branching gas flows, especially in a gas chromatography plant, having an inlet branch (3) connected to the output of a separating column (1) and two outlet branches (5,6) which extend from a junction to subsequent parts of the plant, characterized in that a first outlet branch (6) is connected by way of a shutoff valve (10) to means producing a pressure lower than the pressure in the other outlet branch (5).

2. A device according to claim 1, characterized in that a scavenging gas feed (11) is disposed in the first outlet branch (6).

3. A device according to claim 1, characterized in that an interceptor (8) is present in the first outlet branch (6) between the junction and the valve (10).

4. A device according to claim 3, characterized in that the interceptor (8) comprises a number of adsorption tubes connected alternately into the flow path.

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