3.1.1 *Sampling*

Each cycle, the gas chromatograph takes a fresh sample of the air or gas that is to be analysed into a sample loop. This is done by a small membrane pump in the instrument. The capacity of the pump is 1.5 l/min. Depending on the distance of the instrument from the source the pump can be switched on from 10 seconds to several minutes.
The dimensions of the sample loop depend on the concentration of the compounds that have to be analysed: from 75 microliters for the high ppm range to 3 ml for the low ppb range.

3.1.2 *Preconcentration*

The machine works semi-continuously: the first step is flushing the sample tubing by drawing air (or sample gas) through it with a pump. Then the pump is switched off and with the help of an indirect piston system a volume of 35 ml sample gas is preconcentrated on a Tenax® or Carbograph column. This procedure can be repeated until enough sample material has been drawn. Before each sampling the pump can be switched on again for a short time. The preconcentration tube can be purged with carrier gas to remove oxygen and water if desired.

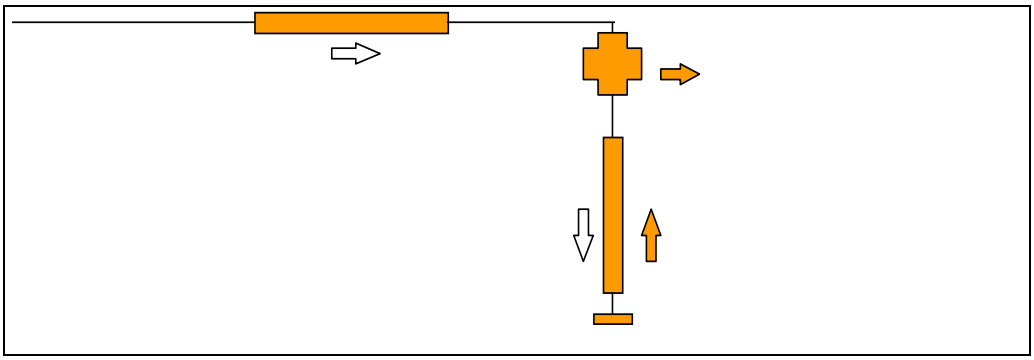

Fig. 3.3: principle of preconcentration: the dark arrows show the airflow for emptying the piston, the white arrows show the backflush, during which the sample is sucked through the preconcentration tube

For hydrocarbons with boiling points below 20 °C the absorption capacity of the medium can be a problem, because the compounds can break through during sampling: in this case they are not trapped completely and in the time between trapping and desorption they may evaporate. Enhancement of the capacity is possible by cooling the preconcentration tube during absorption. Bij 3.1.2
The preconcentration tube can be cooled by radiation. To do this, the preconcentration tube is embedded in an aluminium block. This block is cooled on both sides by Peltier

elements. To avoid freezing or condensation in the system, drying of most samples will be needed. The lowest temperature that can be reached in practice is – 5 °C.