HANDLING, QUICK OPTIMIZATION AND CHOICE OF COLUMN WALL MATERIAL IN CAPILLARY GAS CHROMATOGRAPHY

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ABSTRACT

The handling, i.e. installation of glass capillaries, is discussed. The modification of the underground pretreatments by straightening the glass capillaries is shown by SEM and the influence of this procedure is discussed. A very useful way of quick optimization for flame detectors is given. Also the fast setting up of carrier gas velocities is shown together with the possibility of calculating the velocity and the carrier gas flow. The aims in the choice of column wall materials are given. Soft glass, borosilicate glass, fused silica and quartz are discussed.

The installation only of glass and fused silica capillaries is discussed here, because today metal capillaries are seldom used. The installation of fused silica capillaries normally brings no problems because of their good flexibility. A too narrow bending ratio, however, should be avoided, because they can break. Alternatively this could cause a complete interruption of the capillary inside, the polyimide lacquer, because of the high brittleness of fused silica. It should be pointed out that also in the case of slitted polyimide or scratched polyimide there is the possibility of some carrier gas diffusion.

The connection of glass capillaries is principally not very difficult, if they are handled carefully. Just the end pieces must be straightened. The most used column wall material in Europe by now is glass. Therefore, this procedure will be given in the next figures. For straightening the glass capillaries normally only a common gas lighter is necessary. The straightening of borosilicate glass, however, is somewhat more difficult, because the softening range of borosilicate glass is about 80°C higher than that of soft glass. The ranges are for soft glass 500-650°C and for borosilicate glass 550-730°C.

These temperatures are the lowest to be used. The straightening of the glass capillary ends is to be done as shown in Fig. 1. As can be seen, the capillary must be held in the left hand and heated by a common gas lighter.
After having straightened the sagged end as shown in Fig. 2, the glass capillary is turned to a position as shown in Fig. 3, whereby a small zone of the straightened end undergoes further heat treatment. The correct temperature is reached when the heated zone becomes dark red; then the capillary is to be bent immediately in the desired direction with the second finger of the hand with the gas lighter.

The higher the flame temperature, the quicker the straightening can be done and the better the quality of the straightened glass capillary ends, because the pyrolytical decomposition of the stationary phase runs