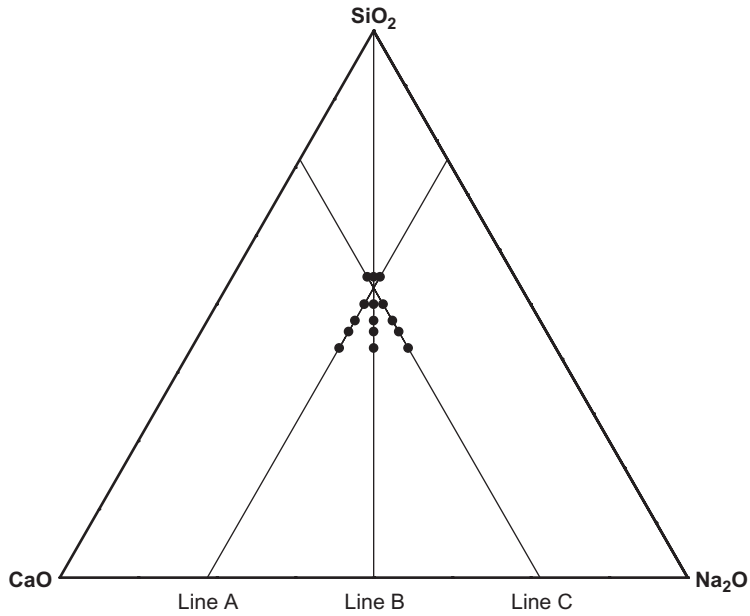

FIG. 3.2 Glass compositions belonging to the SiO_2-CaO-Na_2O diagram.

recommends equimolar ratios of CaO and Na_2O. Finally, the third line denoted C relates to the work of Andersson et al. (1990). In this line, the molar percentage of CaO is constant and equal to 23.5.

On each line, five compositions were selected: the first, to be noted as 1 in the rest of the study, contains 42% of silica, the second 45% (=2), the third 47% (=3), the fourth 50% (=4), and the fifth 55% (=5).

Table 3.2 summarizes the molar compositions of the selected glasses.

The bioactive glasses, noted 1–3, are invert glasses; the others are traditional glasses (Trap and Stevels, 1960; Zarzycki, 1982).

3.1.2.3 Bioactivity of the SiO_2-CaO-Na_2O System

3.1.2.3.1 Bioactivity in Terms of HCA Nucleation Time

Each composition was studied under the same conditions as those used for Bioglass 45S5.

These ternary glasses, without phosphorus, still develop a HCA layer. It is indeed the environment surrounding the sample during the various stages of surface reactivity of the glasses that allows the nucleation of the apatite layer and therefore the bioactivity.

While Bioglass 45S5 is bioactive in 12 h, longer times have been observed in the case of the ternary glasses.