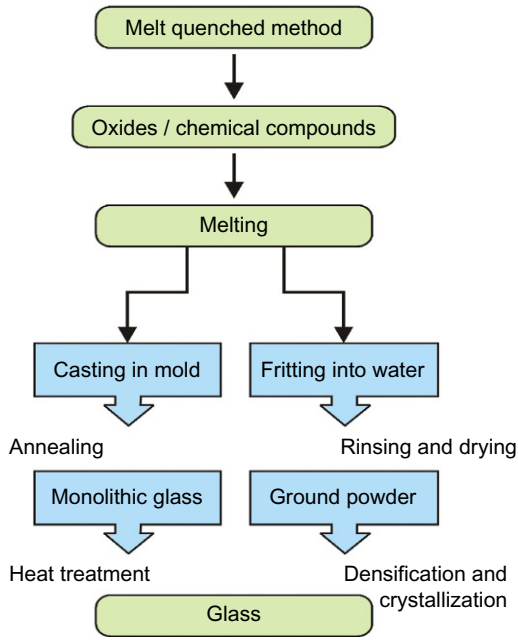

FIG. 18.1 Schematic representation of melt quench method for the development of glass particles.

participated to gel particles and a colloidal sol is produced (Boccaccini et al., 2016). The nanoparticles assembled together to form a silica-based gel network. After the addition of prehydrolyzed precursor to colloidal sol, the process of gelation continues for few more hours. The excess water is then removed by a drying process. To remove the residues of precursor the gel is heated above 680°C, which decomposes the gel network (Martin et al., 2012). Tetraethyl orthosilicate (TEOS) can be used as silicate-based precursor. Whereas calcium nitrate tetrahydrate and triethylphosphate, are also commonly used precursors for calcium and phosphate respectively (Boccaccini et al., 2016). The sol-gel method can be controlled by altering the initial precursors, time allowed for gelation, catalysts, degree of solvation, gelation conditions, or physical processing of the gel itself (Owens et al., 2016a). The sol-gel technique yields particles that have a massive one up on the conventional melt derived technique in terms of a higher pore volume and specific surface area (Sepulveda et al., 2001). This is directly proportional to the level of bioactivity observed, which in turn will almost certainly impact glass dissolution and apatite formation rates.

Some bioactive glasses have been prepared as porous scaffolds by the sol-gel process such as 58S with the composition (mol%): 60% SiO_2, 36% CaO, 4% $P2O_5$. Moreover, there is a high incidence of Si–OH bonds in the glass matrix after formation. The reason in large part is the low elaboration temperatures, which hinders oxolation reactions from proceeding. Hence, the resulting