the degree of refining is determined by distribution equilibria (5.20) to (5.23), where the (parentheses) refer to components dissolved in a slag phase and the underscored symbols refer to dissolved elements in liquid silicon:

$$4\underline{Al} + 3(SiO_2) = 3Si(l) + 2(Al_2O_3) \tag{5.20}$$

$$2\underline{Ca} + SiO_2 = Si(l) + 2(CaO) \tag{5.21}$$

$$2\underline{Mg} + SiO_2 = Si(l) + 2(MgO) \tag{5.22}$$

$$S(l) + O_2 = (SiO_2) \tag{5.23}$$

Theoretically it is possible to remove Al and Ca to very low levels, but in practice this is prevented by the large heat losses occurring during this operation. Temperature drops to 1700 to 1500°C, and to avoid freezing of the melt, some of the silica needed for slag

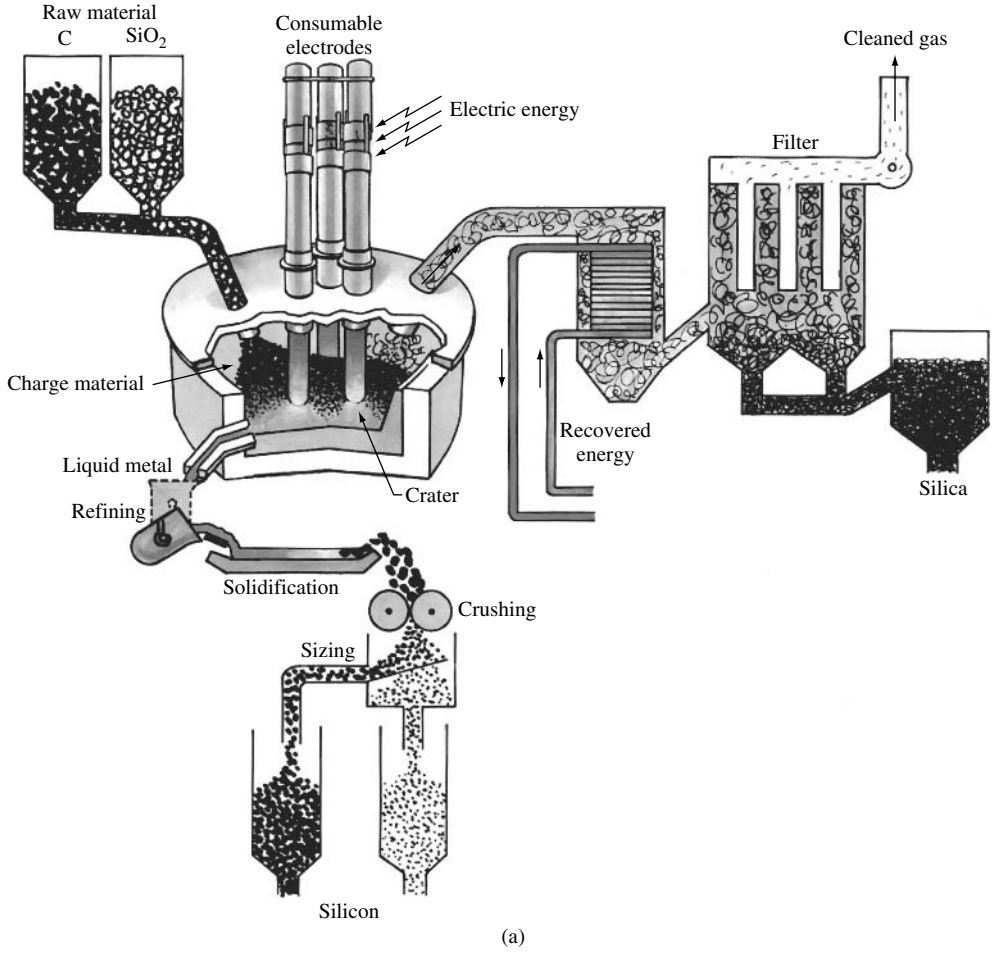

Figure 5.1 (a) and (b) Schematic representation of a furnace for production of metallurgical grade silicon. Reproduced from Schei A, Tuset J, Tveit H, *Production of High Silicon Alloys*, Tapir forlag, Trondheim (1998) with permission by Haluard Tueit