6.7 Energy Consumption

Well known measures for saving energy in evaporation processes are multi-effect-evaporation (co-current or counter-current) or vapour recompression (thermal or mechanical).[14,49,50] These concepts are applied to crystallization processes, too. In addition, crystallization processes may be part of a larger installation, for which a global optimum related to energy consumption is sought. This optimum of the entire production system can be found by pinch-point-analysis.[37] Minimization of exergy losses by, for instance, unnecessary high temperature differences for heat transfer are part of the optimization considerations. The objective function is the economy of the entire plant. This implies weighing against each other of the cost of energy and the cost of depreciation of the investment.

6.8 Process Integration

A continuously operated crystallizer is part of a larger process with a number of recycle streams. Figure 6.7 depicts a rather simple academic example of such a plant. The recycle streams shown are necessary for maximizing the yield and keeping all process parameters within their specified range. For instance, the solid content in the crystallizer and in the solid–liquid separation section has to be chosen such that the suspension is not too "thin" and not too "thick". A typical value would be for instance 20 to 30 volume-% of solids. Furthermore, the crystallizer ought to be fed with crystal free solution. Therefore, the dissolver is required. As a rule, the feed solution contains impurities which would level-up in the process, if no solution was purged

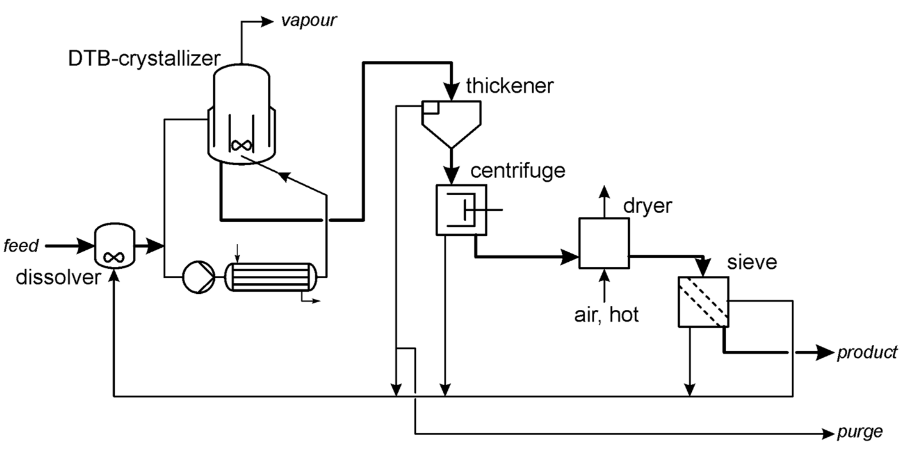

Figure 6.7 Simplified continuous bulk crystallization process comprising a DTB-crystallizer, solid–liquid separation (thickener and centrifuge), dryer (*i.e.* fluidized bed), and sieve. The solids in the recycle stream are dissolved before being fed to the crystallizer. The purge stream is required to limit the impurity level in the process.