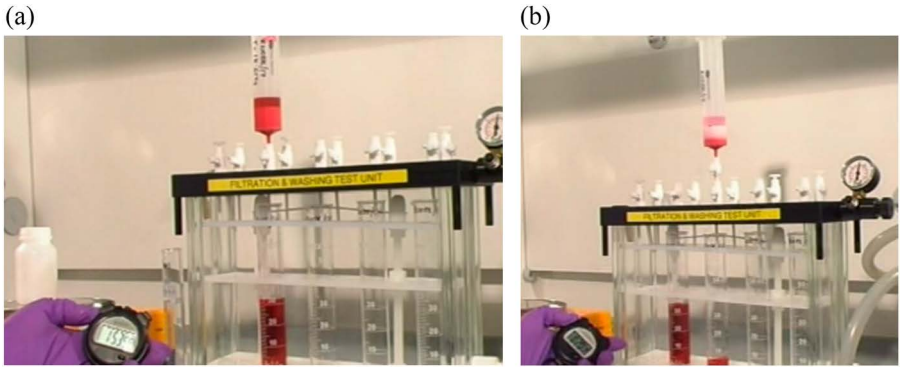

Figure 13.2 Small scale laboratory filtration unit adapted from a Biotage flash chromatography system; (a) filtration; (b) washing.

between the filter tube and the vacuum chamber, the experimentalist then records the time taken to collect predetermined volumes of filtrate. The data is plotted to generate a t/V *vs.* V plot in accordance with eqn (13.1); the value of the specific cake resistance, α, is derived from the gradient, and the filter medium resistance, R_m from the intercept. In principle a simple experiment along these lines provides the data needed to predict the duration of filtration at larger scale. However, there are some other important aspects must be considered.

13.3.1 Filter Medium and Medium Resistance

A number of key characteristics of the filter medium need to be considered. It must be chemically compatible with the intended process stream, for example, polymeric media must not be subject to leaching of plasticisers by the process solvents; metallic media should not be vulnerable to acid or base chemistry. The physical strength and rigidity of the filter medium must also be considered; the filter medium must not shed particles into the product. As the filter surface area is increased to provide sufficient capacity to deliver commercial quantities of product it becomes necessary to strengthen and to support the medium to prevent flexing. This dimensional stability is especially important when the product is to be removed from the filter by mechanical means and where close clearances are desirable, but the medium must not be damaged by mechanical contact. The filter pore size should be consistent across the entire medium surface and the filter structure should be such that the surface is not damaged easily. These requirements combined with commercial preference for filter media with a low resistance and ease of cleaning lead to a range of media types being available. The most significant classification is between depth filters and surface filters. Depth filters are relatively thick and form a cake by collecting product crystals within the structure of the filter medium. This makes depth filters excellent for recovering modest amounts of material from large process streams where the objective