



CHAPTER 2

COLUMNS OPERATED WITH LIQUID PULSING

Pulsed columns, originated by Van Dijk⁽⁷⁾, are now becoming accepted as the most satisfactory general purpose types of columns for liquid - liquid extraction. Though the column capacity is reduced by the pulsing effect, higher mass transfer rates permit lower column heights, and hence pulsed columns are preferred in the extraction of radioactive materials where cost of shielding is an important consideration. Various mechanical arrangements for liquid pulsing have been suggested by several workers.^(8,9,10,11)

Mechanical pulsing or air pulsing may be used. Columns can be divided into two types in another way,⁽¹²⁾ i.e. those which are packed throughout their height in a similar manner as static packed columns, and other which have sieve-plates located at regular intervals from top to bottom. In both cases, the principal advantage of a pulsed column over a simple packed column is a reduction in stage height, and therefore in overall column height, by a factor variously stated as about 3, or 5 to 10.^(10,13)

Pulsed columns containing conventional types of random packing have been found to have similar theoretical stage heights to those with plates. There is, however, a tendency for the packing to orientate⁽¹⁴⁾ owing to the

pulsing action and this increases the stage height a little. The maximum flow rates (limited by flooding) in a pulsed packed column need be operated at a slightly lower throughput than when the same column is run without pulsing⁽⁴⁾, however a large reduction in height of a theoretical stage is obtained.

It is usual to operate either types of pulsed column with the liquid - liquid interface near the top, as with a static column, i.e. with the aqueous phase continuous. It is sometimes advantageous, however, to run with the solvent phase continuous, e.g. when it is particularly important to avoid the carry - over of solids from the interface into the solvent phase.

The interface height is achieved in the normal manner, i.e. by balancing the interface position against a limb of aqueous phase vented to the atmosphere which is leaving the column. Adjustment of the height of the balancing limb allows the interface to be in any desired position.