

Batch distillation column

Technology



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During the start-up period, the column is adjusted in a way that ensures the distillate produced will be of desired purity (Jana, 2008, 145). The production period is, in contrast, the part of the process during which the product is withdrawn from the column.

The operation of the batch distillation column takes place in four ways. Constant reflux ratio, total reflux, optimal ratio, and constant distillate composition are the methods used in the operating batch distillation column. The method of operation of the batch distillation column is dependent on the type of mixture that is being separated. In the separation of the methanol/water mixture, for instance, the total reflux method could be appropriately used.

In total reflux, the batch process is left alone to approach steady-state before the withdrawal of the distillate product is allowed to start. In order to now achieve steady-state, overhead vapors are condensed and collected in the condenser-reflux drum system (Diwekar, 2011, 5). All the liquid that has been condensed is directed to return to the column. When this happens, the liquid is further taken through the distillation process several times until there is no more distillate product to be removed. This continuous process of reflux and subsequent distillation ensures that the maximum possible purity is obtained since no more distillate product is left unremoved.

The process that goes on in the batch distillation column is a complex one. The liquid mixture is put in a vessel that is known as the still spot. The vessel is then heated to such a time as vapor is produced, and the vapor is directed to a rectifying column. As the vapors rise in the column, they become enriched in the component of the mixture that is more volatile. In the initial start-up period, all the vapor collected from the top section of the column is

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condensed; this vapor is then directed to return to the column (Diwekar, 2011, 6). This goes on until there is no more change that is noted in the composition; that is until the desired purity of the distillate is achieved. After this, the production phase is allowed to commence. Production is the collection of the distillate as a product stream.

In the separation of a methanol/water mixture, methanol, alcohol, is the more volatile component. For the separation of this mixture, the system below could be used:

Batch distillation column:

Condenser

Reflux drum

Steam

Still spot condensate

Batch distillation is the preferred method of separation when there is a need to separate biochemicals and high technology chemicals that are in small quantities. One unique feature of this method of separation is the flexibility of operation (Jana, 2008, 147). Each component will require its own column, and this method can be used for the separation of relatively pure components. Batch distillation has found use in pharmaceutical, food, biochemical, and fine chemistry industries.