
摘要

香草醛，其化学名称为 3-甲氧基-4-羟基苯甲醛，其广泛应用于食品、饮料、烟草、化妆品、医药领域，在农业上它还可以作为甘蔗的增产剂和催熟剂，由于它的应用范围广且需求量大，在市场发展前景也十分良好。

本设计采用邻溴对甲酚法制香草醛，以邻溴对甲酚和甲醇钠为原料，只通过甲氧基化和催化氧化两步反应即可生成目标产物，年产量达到 2000 吨，工作时间为 8000h/年，进行了全工段的物料衡算和热量衡算，并且对精馏塔设备进行了选型和设计。

本设计采用的是填料塔，采用的是规整填料，并且对精馏塔的设计参数进行了计算，由计算可知精馏塔的塔径 $D=2.9\text{m}$ ，塔高 $H=20.6\text{m}$ ，塔釜再沸器的换热面积经计算 $S=63.3\text{m}^2$ ，塔顶所使用的冷凝器是列管式不锈钢材质的，其换热面积 $S=390.5\text{m}^2$ ，采用的分布器孔径 $d=2.0\text{mm}$ ，孔数 $n=721$ 个，挥发管的管径为 $D=1.4\text{m}$ 。根据计算各项数据符合标准，可使整个精馏过程顺利高效的进行。

关键词：香草醛；邻溴对甲酚；甲氧基化；氧化

Abstract

Vanillin, whose chemical name is 3-methoxy-4-hydroxybenzaldehyde, is widely used in the fields of food, beverage, tobacco, cosmetics and medicine. In agriculture, vanillin can also be used as a yield increasing agent and ripening agent for sugarcane. Because of its wide application and large demand, it has a good market prospect.

In this design, 2-bromo-4-methylphenol is used to produce vanillin. With 2-bromo-4-methylphenol and sodium methoxide as raw materials, the target product can be generated only through two steps of methoxylation and catalytic oxidation. The annual output reaches 2000 tons and the working time is 8000h / year. The material balance and heat balance of the whole section are carried out, and the distillation tower equipment is selected and designed.

This design uses a packed tower and structured packing, and the design parameters of the rectification tower are calculated. From the calculation, the tower diameter of the rectification tower was 2.9m, the tower height was 20.6m, and the tower kettle reboiler. The heat exchange area is calculated to be 63.3m². The condenser used at the top of the tower is a tubular stainless steel material. Its heat exchange area was 390.5m². The distributor has a hole diameter of 2.0mm, a number of holes of 721, and a volatile tube. The pipe diameter was 1.4m. According to the calculation, the data conforms to the standard, and the entire distillation process can be carried out smoothly and efficiently.

Key words: vanillin; 2-bromo-4-methylphenol; methoxylation; oxidation

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