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【摘要】

冷凍真空乾燥法是將欲乾燥物以急速凍結的方法先行固化，在適當的真空條件下使冰昇華為水蒸氣，以達到除去物低壓抽氣以及脫附過程三種程序，其低溫冷凍系統分為兩組，一組是供應給預凍使用，另一組是供應給冷凝器使用，應的最低溫度可達-85℃；而真空系統是利用乾式真空幫浦(Dry vacuum pump)進行抽氣，以達到無油氣污染的優點，熱源來輔助產品達到快速乾燥的方法。本論文開發製藥與生物技術產業用之冷凍真空乾燥設備製程研究，以冷凍真空乾燥，以初級乾燥中棚板溫度為20℃、10℃、0℃、-10℃與-20℃，探討在不同棚板溫度下對樣品溫度、壓力、品溫度，所得到的乾燥度越佳，外觀更完整，以棚板-20℃下20%葡萄糖溶液失水率可達88%，凍乾後呈現不規則、20%食鹽水溶液乾燥後外型較完整呈現鬆散塊狀。乾燥過程中架設低溫量測計與真空壓力計，分析凍乾樣品之抽氣、凍結溫度、抽氣速率、終極壓力、產品的含水量等量測，此外利用微觀測系統以動態即時的方式觀測產品凍乾過程。

【英文摘要】

Vacuum freeze-drying is by solidifying the dry object by means of rapid freezing, then sublime the ice into water, the water content in the object. Vacuum freeze-drying includes three procedures, namely lyophilization, low-temperature process. The low-temperature freezing system includes two parts, one is for pre-freezing, and another is for condensing temperature down to -85℃. The vacuum system uses dry vacuum pump for air extraction to offer advantage of zero oil of circulating water tank heating system to provide plate heat source to aid the product reaching rapid drying. This pharmaceutical and biotechnology industries, used vacuum freeze-dried 20% glucose solution and 20% saline solution, the temperatures of the plates in preliminary drying were 20℃, 10℃, 0℃, -10℃ and -20℃, in order to discuss the effect of temperature, pressure, and dryness. The experiment revealed that as the plate temperature is low and close to the product temperature, the appearance is more intact. When the water loss for 20% glucose solution under plate temperature of -20℃, irregular pores after freeze-dried. The water loss for 20% saline solution could reach 82%, and the appearance very good. During the drying process, low temperature measuring device and vacuum pressure gauge were installed to analyze the air change of the drying samples. The freezing temperature, air extraction speed, ultimate pressure, and water content observation system was used to observe the shape change of the product during the freeze-drying process in dry quality.

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