Separation of Al and PVC from Waste Pharmaceutical Blisters fro Sustainable Recycling

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Abstract

Polyvinyl chloride (PVC) accounts for a high proportion of medical waste, especially waste pharmaceutical blisters. The recycling of this PVC waste is more difficult and wasteful because of the sustainable connection with the aluminum (Al) layer that acts as a drug covering. The current study aims to separate Al and PVC from waste pharmaceutical blisters using NH_3-NH_4Cl-H_2O solution. The optimal conditions are a solid-liquid ratio of 1:25; NH_3 5M: NH_4Cl 2.5M ratio of 2:1; soaking time of 60 minutes and temperature of 70^oC. Under these conditions, the recovery of Al and PVC reached 99.5%, which means the complete separation of aluminum and PVC by froth flotation. In addition, conditions of sample size and type of waste pharmaceutical blisters were investigated. The study also designed a process of sustainable recycling of waste pharmaceutical blisters and analyzed economic benefits. This study proposed a simple method to implement, economical and environmentally friendly thanks to the recovery of aluminum and plastic separately.

Table 1: Economic analysis of aluminum and plastic recovery from 1000 kg pharmaceutical blisters with NH_3-NH_4Cl-H_2O solution

Items	Amount	Price	Money (VND)
Electricity	124,8 kW	3,000 VND/kW	374,400
Water	10 m^3	10,800 VND/m^3	108,000
NH_3	6944 l	11,000 VND/can	2,546,133
NH_4Cl	1125 kg	25,500 VND/bao	1,147,500
Labor	-	-	208,802
Aluminum	110 kg	33,000 VND/kg	3,630,000
PVC	890 kg	13,000 VND/kg	11,570,000
Total			**10,815,165**

References

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