

Recovery of Chemotherapeutic Agent, Painkillers, and Antibiotic Drug from Unused Pharmaceutical Products by Crystallization

Tu Lee[†]

National Central University

(tulee@cc.ncu.edu.tw[†])

The concept of drug recycle by recovering active pharmaceutical ingredients (APIs) from unused drug products was demonstrated by using arsenic trioxide (i.e. chemotherapeutic agent), acetaminophen (i.e. painkiller), (R,S)-(±)-ibuprofen (i.e. painkiller), and tetracycline HCl (i.e. antibiotic) as case examples. Special API recovery protocols were developed to address the problem of the sheer number of excipients in the commercial drug products. The protocol for liquid dosage form drugs was based on evaporative crystallization as in the case of arsenic trioxide; while the protocol for solid dosage form drugs was mainly based on solid-liquid extraction, filtration, and crystallization as in the case of acetaminophen, (R,S)-(±)-ibuprofen, and tetracycline HCl. By utilizing those approaches, recovery yields of 76, 59, 68, and 73 wt% for arsenic trioxide, acetaminophen, (R,S)-(±)-ibuprofen, and tetracycline HCl could be achieved, respectively. More importantly, all of those recovered APIs were highly pure, as verified by HPLC assays, and the crystal forms of those recovered APIs were in conformity with the standards.