

Abstract

The coagulation process of skim natural rubber latex was investigated. The study covers ammonia removal from skim latex, acid usage reduction in coagulation, agitating systems for improving coagulant's efficiency, drying of skim rubber, as well as the physical property of skim rubber. The chosen coagulants were chitosan in acetic acid solution, sulfuric acid solution and solutions of cationic polyacrylamide-based coagulants. It was found that forced convection could remove ammonia in latex rapidly in the first hour and up to one point the removal of ammonia seemed impractical. In the coagulation of skim latex with and without pH adjustment, the solid removal percentage of normal skim latex was better than that of neutral skim latex when using chitosan in 2% wt/wt acetic acid solution. Nonetheless, it may not be suitable for commercial use since it was difficult to separate the cream phase from the serum phase. Besides, using chitosan in 1% wt/wt acetic acid solution could increase the solid removal percentage and reduce the usage of acetic acid at the same time. The solid removal percentage, when using chitosan in acetic acid solution, was better than using only acetic acid. It was also found that reduction of sulfuric acid usage to 7.7 phr was possible yielding less acidic and less turbid serum. When comparing between applying agitation system for the whole coagulation process and applying it only for the coagulant loading step, it was seen that the latter was not appropriate in small scale. Moreover, in the scale-up procedure up to 3 liter system, the controlled power per unit volume was proved to yield similar coagulation performance for either using chitosan in acetic acid solution (chitosan (phr): acetic acid (phr) = 8.26:10.84) or sulfuric acid (7.7 phr). For the effect of drying at various temperatures, it was shown that rubber coagulated by chitosan in acetic acid solution (chitosan (phr): acetic acid (phr) = 8.26:10.84) dried faster than the rubber coagulated by sulfuric acid (7.7 phr). However, apparently, the surface of the latter appeared smoother and lighter than the former. In addition, the physical property of skim rubber and serum obtained from 3 coagulants, chitosan in acetic acid solution (chitosan (phr): acetic acid (phr) = 8.26:10.84), sulfuric acid (7.7 phr) and

polyacrylamide in acetic acid solution (WF5803 PAM (phr): acetic acid(phr) = 0.54:8.58) was studied. It was found that the rubber coagulated by chitosan in acetic acid solution had higher content of non-rubber regarded as contaminants than both by sulfuric acid and polyacrylamide while by using chitosan, the quality of serum was the best. Considering the cost of coagulants, ranging from low to high costs, using sulfuric acid (7.7 phr) costs the least, followed by WF5803 in acetic acid (WF5803 PAM (phr): acetic acid (phr) = 0.54:8.58) and (chitosan (phr): acetic acid (phr) = 8.26:10.84), respectively.