

## Preparation of Boron-type Frame Retardant Powder from Bittern for Boron Utilization

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### Summary

Halogen-free flame retardants have been widely used in the frame retardation of polymers, and borate-intercalated layered double hydroxide (LDH) are paid attention. On the other hands, bittern is one of the resources from seawater to be desired for a new utilization.

In this study, we attempted to synthesize a new boron type frame retardant powder including borate-intercalated LDH from bittern with addition of cheap agent,  $\text{AlCl}_3$  or  $\text{FeCl}_3$ .

Boron-type LDH can be synthesized from bittern with addition of  $\text{AlCl}_3$  and  $\text{FeCl}_3$ , and the products synthesized with  $\text{AlCl}_3$  addition in the solution at pH 9.5 indicate high uptake of boron from the synthesis solution and high frame retardant ability in polyvinyl alcohol (PVA).