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A novel process to recycle the highly concentrated calcium and chloride ions in the gelatin acidification wastewater

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## chloride ions in the gelatin acidification wastewater

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6 Highlights:

7 1) The high concentration of Cl<sup>-</sup> is regenerated as hydrochloric acid, which could be

8 returned to the acidification process.

9 2) The new process can produce CSH, with purity up to 98% and an output of 75kg
per tonne of wastewater.

3) The discharge of wastewater is reduced by 70%, and the concentration of harmful
ions is reduced greatly.

13 4) The operating costs are reduced about a half.

Abstract: The effluents of the gelatin acidification process are highly complex and 14 difficult to treat, especially in the presence of high concentrations of Cl<sup>-</sup>, which not 15 only pollute the environment, but also seriously hamper the development of bone 16 gelatin enterprises. In this study, a novel cleaner production process for recycling the 17 highly concentrated calcium and chloride ions is proposed to basically solve the 18 problem of acidification wastewater management in the gelatin industry. In this 19 process, wastewater from the acidification process is firstly reacted with sulfuric acid 20 to generate calcium sulfate and then the effluent is further treated by distillation. The 21 outcomes demonstrate that the concentration and recycling rate of hydrochloric acid 22 in the distillate could reach close to 6.1% and 75% under the optimal conditions, and 23 the recycled hydrochloric acid could be reused in the acidification process. 24 25 Meanwhile, the emission of wastewater could be reduced about 70%. The purity (98%) and composition (calcium sulfate hemihydrate) of the calcium sulfate were 26 27 explored by X-ray photoelectron spectrometer and X-ray diffraction. The output of

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