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Evaluation of the microbial cell structure damages in alkaline pretreatment of waste activated sludge

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1 **Evaluation of the microbial cell structure damages in alkaline**
2 **pretreatment of waste activated sludge**

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6
7 **Abstract**

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9 This study investigated the damages of microbial cell structures, as well as the
10 relationships between these damages and the release of cellular organic matter in the
11 pretreatment of waste activated sludge (WAS) by using alkaline pretreatment as model.
12 In the alkaline pretreatment of WAS, the most damage of bound extracellular
13 polymeric substances (EPS), cell walls, cell membranes, and cell nuclei occurred at
14 pH 11.5–12.0 (46.2%), pH 11.0–11.5 (27.3%), pH 9.0–10.0 (34.2%), and pH
15 11.5–12.0 (44.4%), respectively. The damage percentages of these cell structures in
16 the pH stabilization stage were low because most of the damages occurred when the
17 pH increased. The structural integrities of sludge microorganisms were all damaged in
18 the pH increase stage. The damages of EPS, cell walls, and cell membranes were
19 significantly correlated with the release of cellular organic matter, and these damages
20 were necessary to release the cellular matter in WAS.

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