奈米膠態矽與蒙脫土在造紙廠污泥脫水之應用

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摘 要

奈米膠態矽及膨皂土已成功應用在造紙濕端.保留系統，來 提升纖細物及填料的留存。奈米蒙托土雖然與奈米膠態矽及膨皂 土性質類似，主要化學組成為氧化矽及氧化鋁，但未廣泛使用在 造紙產業。目前有少數研究將奈米膠態矽、膨皂土及蒙脫土應用 在污泥脫水。飛灰主成份為氧化矽及氧化鋁，已被使用在脫水助 劑，但脫水機構仍未被探討。本實驗所使用的一次污泥及二次生 物汙泥取自台灣中部生產文化用紙及工業用紙的某造紙廠。 第一階段研究，使用傳統陽性高分子及奈米膠態矽(膨皂 土)，單獨或混合添加來探二種污泥的脫水效率。污泥脫水效率指 標為比過濾阻力(SRF)、虹吸抽吸時間(CST)及膠體溶解電荷(PCD) 等。應用23階層實驗設計來探討添加量及添加順序的主效應及相 互效應。階層分析CST、SRF及PCD等實驗結果顯示，對於一次污 泥而言，三種主效應都統計明顯，但相互效應都統不明顯。對於 生物污泥而言，只有陽性高分子主效應統計明顯，其餘主效應及 相互效應皆統計不明顯。添加順序實驗中顯示陽性高分子必須先 添加，再添加奈米膠態矽(膨皂土)。假如先添加奈米膠態矽(膨皂 土)，再添加陽性高分子，會破壞一級污泥的脫水效率。 第二階段研究，使用陽性高分子單獨添加及.脫水助劑(陽 性高分子與奈米膠態矽、膨皂土、奈米蒙脫土及飛灰)來探討添加 量及添加順利的最適條件。實驗結果顯示，.脫水助劑系統較單 脫水助劑系統具有較佳的脫水效率。依據上述實驗結果，建議在 .污泥脫水系統中，奈米膠態矽、膨皂土、奈米蒙脫土及飛灰等 在污泥脫水機構中提升脫水效率所扮演的角色。

關鍵詞 : 奈米膠態矽、膨皂土、奈米蒙脫土、飛灰、一級污泥、 生物污泥、比過濾阻力(SRF)、虹吸抽吸時間(CST)、膠體溶解電荷(PCD)。

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