

Upset Early Warning Systems for Biological Treatment Processes, Source-Effect Relationships

A laboratory study was conducted to elucidate the source-effect relationships for seven chemicals (sources) that can cause activated sludge process upset (effect). These chemicals were studied over a range of concentrations using both nitrifying and non-nitrifying laboratory-scale activated sludge sequencing batch reactors. Effects were characterized according to traditional methods of evaluating process effluent and mixed liquor quality.

A range of process effects were observed for both biomass sources. Overall impact was assessed and the degree to which a chemical caused an impact on process performance was considered to be more detrimental than if a chemical had multiple process effects that were moderate. The order in which chemicals caused adverse effects for the nitrifying biomass was: ammonium < octanol < DNP < cyanide < CDNB < cadmium - pH 11.

For the non-nitrifying biomass, the order in which the chemicals caused adverse effects was: octanol < ammonia < DNP < cyanide < CDNB < cadmium < pH 11. Almost all chemicals caused multiple process effects, but the intensity and type of process effect was not always predictable based on the chemical applied.

The findings show that there are multiple ways that chemicals can impact activated sludge plants, and suggest that corrective action practices need to be tailored based on the nature of the chemical causing the upset.

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