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## Development of a Titanium Dioxide Photocatalyst in a Draft Tube Spout-Fluid Bed Reactor to Reduce Contaminants in a Water Supply

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Every aspect of life depends on water. Besides conventional water treatment (i.e. pretreatment, coagulation, flocculation/sedimentation, filtration, and then disinfection), other water treatment methods that are used are the addition of activated carbon to water prior to disinfection and membrane treatment or reverse osmosis. Activated carbon absorbs organic contaminants from the water. Reverse osmosis removes metals, salts, and other dissolved solids using a semi permeable membrane. Unfortunately there are several drawbacks to these methods in removing unwanted organics. Both generate highly concentrated waste streams that are not easy to dispose of and may be too expensive for some countries. This project is currently researching an alternative to conventional water treatment known as advanced oxidation processes – chemical procedures that use semiconductors to oxidize contaminants to hydroxyl and O<sub>2</sub>- radicals by interaction of ultraviolet radiation with water – which will be used in a reactor. The goal is that unwanted organics and disinfection byproducts (DBPs) are eliminated without the generation of waste streams. To date the reactor has passed through 3 stages of development and the catalyst is also still in development. Future data that will be collected include flowrates, pressure gradients in the draft tube and annulus, and solid circulation rate. When this data has been taken, kinetic data such as reaction rates will be taken next. Afterwards, work towards the optimization of the catalyst will begin. Finally, once a catalyst has been optimized, the last step will be to propose methods of integrating this reactor system into large scale water treatment facilities.