

# ASSESSING THE IMPACT OF THE INFLUENT DISTRIBUTION SYSTEM ON THE SOLID SEPARATION OF A UASB REACTOR

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ABSTRACT. UASB reactors have become very popular in Asia and South America for their ability to treat high organic loads and produce biogas as a by-product.

The treatment efficiency highly depends on granules, formed by anaerobic bacteria, which agglutinate in a very specific range of flow velocities between 0.5 and 1m/h. These conditions are controlled mainly by the influent distribution system (IDS), that in addition to allowing the granulation process to occur properly, permits a good contact of the substrate and nutrients with the active biomass. The performance of the gas, liquid, solid separator (GLSS) also depends on a good IDS configuration.

To determine the hydraulic and the solid separation efficiency of five different IDS configurations of a UASB reactor, CFD simulations were conducted, considering the non-Newtonian characteristics of the sludge within the system.

Ansys Fluent, was used to conduct the three-dimensional Eulerian-Eulerian, two-phase CFD simulation. The geometry was developed in Autodesk Inventor (USA) and the mesh generation was performed in Ansys Meshing. The mesh was non-uniform tetrahedral based, with finer elements in the inlet and outlet compared to the rest of the domain. A mesh independency test was performed. The standard k-epsilon turbulence model was used for the continuous liquid phase with extra terms to include interphase turbulent momentum transfer [1].

The full paper will show the results of the volume of stagnant zones calculated for the different IDS configurations, as well as the locations of the volumetric fraction of the sludge bed and blanket. A quantitative comparison will be made of each configuration, highlighting the most efficient one, particularly the one that produces the highest flow lamination. The results of one configuration will be contrasted with the results of a laboratory-scale model.

**Keywords:** CFD; influent distribution system; Gas liquid solid separator; UASB

## REFERENCES

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