Valorization and treatment of wastewater sludge by biological and thermochemical processes: Production of bio-energy and bio-fertilizers

Doha E L Alami1,2, Abderrahim Solhy1,3 and Abdellatif Barakat1,3
1Mohammed VI Polytechnic University, Morocco
2National Institute of Agronomic Research, France

The excessive uses of water in domestic, industrial and agricultural activities lead to produce more wastewater and this latter requires more specific treatment before being reused, which generates higher sewage sludge quantities, rich in organic matters and toxic products. The accumulation and production of sludge in high quantity have a negative environmental impact, which requires their treatment and valorization. Many technologies are developed and used in the wastewater sludge treatment such as, thermochemical process (gasification, combustion and pyrolysis) and biological fermentation (aerobic and anaerobic digestion). These different technologies can produce bioenergy, biochars, bio-oils and bio-molecules at a pilot and industrial scale. Biochar could be used as soil amendment or as adsorbent of some heavy metals and that could be involved in the wastewater treatment operations. Bio-oils are the main products of fast pyrolysis and could replace fossil fuel without taking its chemical instability into consideration. From previous studies, methods like pretreatment of raw sludge and co-digestion with other biomass wastes make the feedstock more accessible to the micro-organisms, which enhance the biogas production yield. The coupling of thermochemical process and biological fermentation process is a promising and an alternative technology to produce energy, to extract the maximum of nutrients from organic wastes and to minimize the environment impact for objective to reach zero waste. This study, proposes a review of works on the valorization of sludge from wastewater into bio-energy and bio-fertilizers. These different technologies used for the sludge valorization are compared with the comprehensive description of the impacts of different pretreatments on their performance on bio-energy and the quality of bio-fertilizers production.

Biography

Doha E L Alami has completed her studies in Process Engineering in the year 2015. Currently, she is a PhD student working on the Conversion of Sewage Sludge into Bio-energy, at the Center for Advanced Materials (CAM) in Mohammed VI Polytechnic University in collaboration with the National Institute of Agronomic Research, France.

doha.elalami@um6p.ma