Hydrodynamic Characteristics in Internal Air Lift Loop Reactor

Ali Abdul Rahman -Al Ezzi, Ghazi Faisal Najmuldeen and Ramesh Kanthasamy
Faculty of Chemical and Natural Resources Engineering, Universiti Malaysia Pahang, Malaysia
Department of Chemical Engineering, University of Technology, Baghdad, Iraq

ABSTRACT
Hydrodynamics is an important issue for the design and development of three phase internal air lift loop reactor. This paper deals with the experimental investigations on the effect of superficial gas velocity within the range 0.01-0.1m/secand50Kg/m3concentrations of solid,solid density (853.5 Kg/m3) on the riser gas holdup, mass transfer coefficient and circulation time of a gas-liquid-solid internal airlift loop reactor and it was characterized using Newtonian and non Newtonian systems. Air-water, air-50% glycerol solution, air-10%ethanol solution and air-10%methanol solution are used as Newtonian liquids and air-2% carboxyl methyl cellulose solution (CMC) is used as a non Newtonian liquid. Polyethylene-non-porous-solid particles were used as solid phase. The phase flow rates and concentration of solid particle had a significant effect on the hydrodynamic characteristics ofthe internal air lift loop reactor such as riser gas holdup (g), mass transfer coefficient (Kla) and circulation time (Tc). From experimental observations g and KLa increased with increasing gas velocity, while Tc decreases with increasing gas velocity.

KEYWORDS: Slurry reactor; Mass transfer; Gas hold up; Circulation time; Solids loading; Liquid-phase Properties

DOI: 10.5829/idosi.wasj.2014.31.11.55