

## **Gas-liquid mass transfer performance of dual impeller system employing rushtons, concave-bladed disc (CD-6) turbines and their combination in stirred tank bioreactor**

### **ABSTRACT**

The degree of oxygenation in stirred tank bioreactor is normally described and characterized by the volumetric gas-liquid mass transfer coefficient ( $k_L a$ ). Throughout this study, the gas liquid mass transfer performance of dual impeller stirring system employing either two Rushton turbines (RT), two Concave-bladed disc (CD-6) turbines or the combination of both was comparatively investigated in Newtonian and non-Newtonian fluid systems. Static gassing-out technique was applied in all experimental  $k_L a$  determinations and subsequent modeling of mass transfer correlations for all configurations were developed by incorporating the effects of power number ( $N_{D2}$ ) and superficial velocity ( $V_g$ ) on  $k_L a$ . Ultimately, the use of dual CD-6 stirrers on a mixing shaft improved the oxygen transfer rate (OTR) by about 5-50 % and 18-65 % higher than the conventional RT-RT system in Newtonian and non-Newtonian systems, respectively.

**Keyword:** Concavebladed disc turbine; Correlation modeling; Oxygen transfer; Rushton turbine; Volumetric gas-liquid mass transfer coefficient