Influence of the mass flow ratio water-air on the volumetric mass transfer coefficient in a cooling tower

Luis Obregón Quiñones¹*, Jorge Duarte Forero², Guillermo Valencia Ochoa²

¹Research Group on Sustainable Chemical and Biochemical Processes, Universidad del Atlántico, Carrera 30 No 8 – 49, Puerto Colombia, Colombia.
²Efficient Energy Management Research Group, Universidad del Atlántico Carrera 30 No 8 – 49, Puerto Colombia, Colombia.

Abstract: A laboratory scale mechanical draft cooling tower with acrylic film type packing was studied. The performance of the tower was assessed at different mass flow ratios of water to air L/G, maintaining constant the water and air inlet temperatures and the packing material. It was found that the relation of the volumetric mass transfer coefficient kya versus the volumetric heat transfer coefficient hₐₐ is not affected by the operating conditions. The small differences obtained are due to the experimental error. For all the value of the ratio L/G in the range of kya/hₐₐ [3,25] the assumption of kya/hₐₐ=∞ cannot be considered and the relation has the following expression

\[ k_ya = 624.76(h_a)^{0.34} \]

However, for kya/hₐₐ>25 the assumption of m=∞ is valid, and the value of kya is approximately 2800 Kg/h.m³.

Keywords: Cooling tower, efficiency, tower packing, volumetric mass transfer coefficient.


DOI= http://dx.doi.org/10.20902/IJCTR.2018.111021

*****