

## AMT TN-06

### Effect of Agitation Frequency on the Heat Transfer Coefficient at Various Process Flow Rates in the Coflore® ACR



Figure 1: A selection of agitators available for the Coflore® ACR.

#### Introduction

The Coflore® ACR is an actively mixed flow reactor, whereby agitators (figure 1) are placed within each cell of the ACR reactor cell block which is subsequently agitated along the horizontal plane at a defined frequency of between 2-7 Hz. In thermodynamics, the heat transfer coefficient ( $h$ ) is the proportionality constant between the heat flux and the thermodynamic driving force for the flow of heat (i.e., the temperature difference,  $\Delta T$ ). With regard to chemical reactions, the ability to control the temperature within a reactor is critical, for example to control exotherms, or for improved reaction selectivity. This testing looked to investigate the impact of agitation frequency on the  $h$ -value.

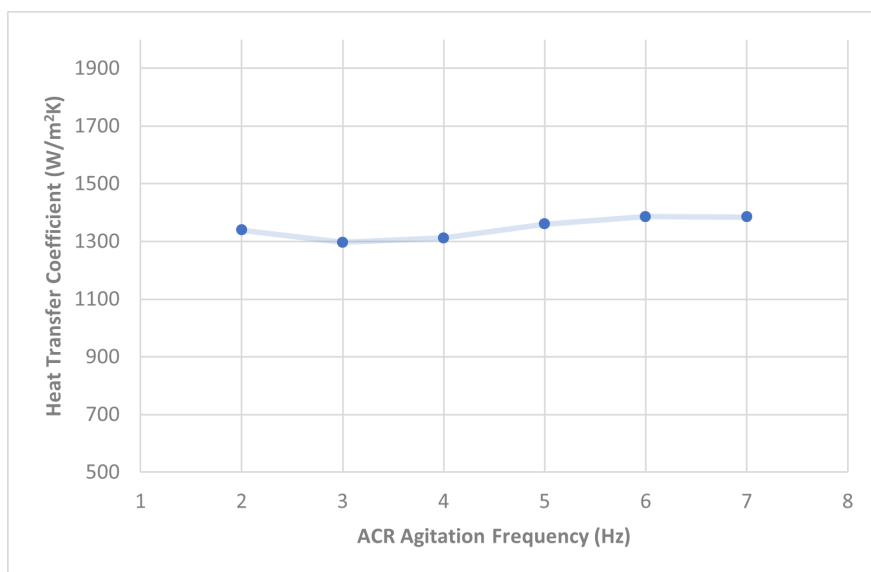


Figure 2: The effect of agitation frequency versus  $h$ -value.



Figure 3: The Coflore® ACR and Huber Unistat P915W.

#### Experimental Work & Results

The Coflore® ACR system was connected to a Huber Unistat P915W (figure 3). Water was fed into the ACR system at 45 mL/min equating to a 2 minute residence time. The  $h$  value was then calculated for the following agitation frequencies; 3,4,5,6,7 Hz. For this testing, high-shear agitators were used (figure 1, far left), and the Huber was set to 80°C. The results, summarised in figure 2, show that altering the agitation frequency has an insignificant effect on the  $h$ -value (+/- 5%).