

## **Optimization of synthesis parameters of mesoporous silica nanoparticles based on ionic liquid by experimental design and its application as drug delivery agent**

### **ABSTRACT**

Optimization is a process utilized to discover the best condition to generate the best possible outcome. One of the common optimization method used in the field of chemistry is response surface methodology (RSM). This method consists of mathematical and statistical techniques which relate the responses with the variables of interest. There are many experimental designs in RSM, and one of the most common one is the Box-Behnken design (BBD). In this work, BBD was employed to analyze the main effects and interactions of the reaction temperature, amount of template, and amount of triethanolamine (TEA) on the two responses which are the surface area (SA) and particle size (PS) of ionic liquid templated mesoporous silica nanoparticles (MSNs). It was found that the SA and PS were fitted with linear and quadratic models, respectively. MSNs with the highest surface area (999.051 m<sup>2</sup> g<sup>-1</sup>) was chosen for the application of drug delivery; thus, drug loading and drug release experiments were conducted. From these studies, it was found that 37% of drug (quercetin) was successfully encapsulated in MSN and, in 48 hours, 32% of the drug was released.