

# **Slack Variable Approach for Mixture Experiment**

**Javier Cruz-Salgado**

Research and Technological Development Department  
Universidad Politécnica del Bicentenario  
Silao, Gto. 36283, México  
jcruzs@upbicentenario.edu.mx

## **Abstract**

There have been many linear regression models proposed to analyze mixture experiments, such as Scheffé model, Slack-Variable model, and Kronecker model. Among these models, the Slack-Variable model is the most controversial one. On one hand, it is very popular among practitioners, especially formulators. On the other hand, it is not so favored by academic statisticians. In this Research Protocol, we advocate that for some mixture experiments the Slack-Variable model has some appealing properties including numerical stability and better prediction accuracy when variable selection is performed. We also discuss how to choose the component as the slack variable, what transformation should be used to reduce the collinearity, and under what circumstances the Slack-Variable model should be used and can be more stable than other types of models.

## **Keywords**

Condition Number, Mixture Experiments, Slack-Variable Model, Scheffé Model, Variable Transformation, Variance Inflation Factor (VIF).

## **Acknowledgements**

This research was supported by CONACYT, UPB and CIATEC.

## **Biography**

**Javier Cruz-Salgado** PhD, Manufacturing and Industrial Engineering, CIATEC/CONACYT November 2015. MS, Manufacturing and Industrial Engineering, CIATEC/CONACYT, August 2012. BS, Industrial Engineering, Universidad Tecnológica de León, March 2007. Currently Chief of Research and Technological Development Department in Universidad Politécnica del Bicentenario México. Research stay at Illinois Institute of Technology in the Department of Applied Mathematics 2013. Intern at Materials Research Department CIATEC 2011- 2012.