Consumers continue to demand alternatives to sucrose in food products and beverages for health reasons, including sweeteners with a lower glycemic index value and/or a lower caloric content than sucrose. Utilizing more than one sweetener has been shown to be a more effective way to substitute sucrose in products. Since product development can be expensive and time consuming, using an optimization method such as mixture design may be an efficient tool as it can test a specified number of blends and provide information about ingredient interactions. The objective of this study was to apply the mixture design method for the optimization of acceptable sweetener blends using coconut sugar, agave, and stevia. An augmented simplex-centroid mixture design was chosen in order to create ten blends of sweeteners that included singular, binary, and tertiary options. Sweetener blends were evaluated in aqueous solutions and gluten-free granola bars. A trained panel and consumer panels (n=60) were conducted to determine overall acceptability of each mixture in both mediums, in addition to liking and perceived intensity levels of certain attributes, with sucrose being used as the control. Taste profiles for the sweetener solutions were also generated using the electronic tongue. Significant differences were found between sweetener mixtures in solutions (p<0.05). Stevia had
the closest liking and intensity scores to sucrose, while agave was the least similar to sucrose in aqueous solutions. Furthermore, most consumer and trained intensity ratings were highly correlated ($R^2 \geq 0.79$) with the electronic tongue analysis. The results suggest that the electronic tongue can possibly be used as a sensory panel substitute for product and ingredient analysis. Granola bars were also found to be significantly different ($p<0.05$), with consumers preferring coconut sugar mixtures. Using contour plots and desirability function analysis, an optimal sweetener combination was found for granola bars of 89.9% coconut sugar, 6.1% agave, and 4% stevia. These results indicated that a mixture design can be a reliable way to develop new sweetener blends for product development. Blending sweeteners can create a more accepted flavor profile and allows more flexibility in sweetener choice for product developers based on production and quality constraints.