Transesterification of lipids into biodiesel is a promising pathway for the production of renewable fuels. It is synthesized by extracting, purifying, and upgrading the lipids found in various plant and animal feedstocks. Microalgae are a promising source of renewable lipids as these organisms can be grown using carbon dioxide emissions generated by coal-fired power plants. When the lipids are extracted from the microalgae, the proteins and carbohydrates are left behind. These remnants can be used to create bioplastics and bioethanol, respectively. However, the relative amounts of lipids, proteins, and carbohydrates obtained from extraction must be controlled in order for the process to be economically viable on an industrial scale. Therefore, it is necessary to optimize the process for each of the components in order to determine the influence of process parameters on product yields. The experiments conducted here were carried out as part of a design of experiments procedure to determine how each of the process parameters, in this case temperature and solvent volume, would affect the yield of each component.