The extracellular matrix (ECM) is a critical tissue component, providing not only structural support for tissues but has also been shown to regulate homeostatic cell signaling. Decellularization is a method of lung engineering that results in an acellular scaffold, used as a potential substitute for transplantation. After whole mouse lung decellularization, the condition in which the ECM is in after being introduced to detergents including sodium deoxycholate (SDC), Triton-X, sodium chloride (NaCl), magnesium chloride (MgCl4), and DNase is extremely important for recellularization. Analysis of ECM proteins present in the scaffold is essential for advancing tissue regeneration, however it is currently restricted by the low solubility of ECM components in reagents commonly utilized for mass spectrometry. Using a variant of the Texas-3-Step protocol, insoluble proteins present in the right lower lobe of decellularized lung ECM were solubilized using a series of salts including guanidine hydrochloride (GnHCl), sodium acetate, and NaCl and enzymes including chondrotinase ABC, endo-beta-galactosidase and heparinase II. Identification and semi-quantification of ECM components was successful and analyses of proteins present will lead to further studies regarding proteins essential for successful recellularization.