Abstract Global climate is significantly changing by global warming because of the excessive emissions of greenhouse gases, most prominently CO_2, into the atmosphere resulting in the climate catastrophe. According to the previous research carbon dioxide has been identified as the main source of global warming. The increased concentration of carbon dioxide in the atmosphere has caused a widespread concern in the world and it has garnered considerable interest across the globe. Sequestration and Storage of CO_2 is recommended as an effective strategy to decrease increasing levels of carbon dioxide in the atmosphere. The high physiochemical characteristics of ILs make them appealing media for absorption of CO_2. In this study, an alkyl ammonium IL, triethylammonium hydrogen sulphate is synthesized and is assessed by FT-IR spectroscopy which helped us to insight into structural characteristics of the compound. To overcome the high-density problem of ionic liquid an electrolyte, KOH, is mixed with IL to enhance the mass transfer of molecules. An experimental set up was established for performing carbon sequestration reactions. These reactions were performed by applying varying conditions of temperature, pressure, and IL/KOH ratio. Response surface methodology (RSM) facilitated the process by determining the most favorable conditions of temperature, pressure, time and concentration ratios of KOH to enhance the carbon sequestration rates by IL. Thus the results indicated that when temperature is kept 30-36°C paired with longer periods of time (60-80min) and high pressure (7.75 bars) leads to higher levels of carbon sequestration up to 5.3mg/ml. The RSM plot shows that IL/KOH ratio does not have major effects on capturing potential of IL. This research work accentuates the significance and vitality of TEAS-KOH system for efficient, economical and sustainable carbon sequestration options which will assist in mitigating Carbon dioxide emissions to improve the current climate catastrophe.