In order to develop a electrolytic production of rare earths, the mechanisms of electrolytic reduction of rare-earth chlorides such as LaCl$_3$, NdCl$_3$, SmCl$_3$ and DyCl$_3$ in molten LiCl-KCl have been investigated by using cyclic voltammetry, chronopotentiometry and impedance spectroscopy techniques. The effects of materials of the working electrodes on the electrochemical response are discussed. Electrode reactions were reversible at the slow sweep rate. The electron numbers involved in each electrode reaction were determined. On the other hand, at higher sweep rates, the electrode reaction was quasi-reversible. LaCl$_3$ was reduced to metallic La. SmCl$_3$ was, however, reduced to SmCl$_2$ in the electrochemical window of the bath.