In order to investigate the redox equilibrium of europium ions in molten NaCl-2CsCl, UV-Vis absorption spectrophotometry measurements were performed for Eu$^{2+}$ and Eu$^{3+}$ in molten NaCl-2CsCl at 923 K under simultaneous electrolytic control of their ratio. Molar absorptivities of EuCl$_3$ and EuCl$_2$ in NaCl-2CsCl at 923 K were determined to be $(420 \pm 21) \text{ M}^{-1}\text{cm}^{-1}$ at $31200 \text{ cm}^{-1}$ and $(1130 \pm 56) \text{ M}^{-1}\text{cm}^{-1}$ at $30300 \text{ cm}^{-1}$, respectively. The formal redox potential of the Eu$^{2+}$/Eu$^{3+}$ couple in NaCl-2CsCl melt at 923 K was determined to be $(-0.941 \pm 0.004) \text{ V}$ vs. Cl$_2$/Cl$^-$. Electromotive force measurements on varying concentration ratios of Eu$^{2+}$ and Eu$^{3+}$, which were performed using a technique based on the combination of electrolysis and spectrophotometry. Cyclic voltammetry was also carried out in order to examine the characteristics of the voltammograms for the Eu$^{2+}$/Eu$^{3+}$ couple in NaCl-2CsCl melt. The formal redox potential of the Eu$^{2+}$/Eu$^{3+}$ couple determined by a spectroelectrochemical method agreed with that determined by cyclic voltammetry $[(-0.946 \pm 0.008) \text{ V vs. Cl}_2/\text{Cl}^-]$. The effects of temperature on the redox potential of the Eu$^{2+}$/Eu$^{3+}$ couple in NaCl-2CsCl, NaCl-KCl, LiCl-KCl, and CsCl melts were studied by cyclic voltammetry in the range from 923 to 1123 K.