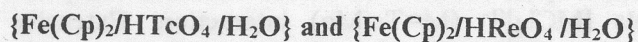


REDUCTION OF Tc(VII) AND Re(VII) BY FERROCENE
IN ACIDIC-AQUEOUS MEDIA

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Comparative studies of TcO_4^- and ReO_4^- reduction have been conducted. To prepare such complexes systems:



solutions of technetium and rhenium acids (~1M) as well as of powder ferrocene were applied. Liquid phase of both systems are similar in its color. It is in the range of pink (or red) color, which is typically for reduced forms of these transition metals. By the methods of spectrophotometry and chemical analysis, reduction of Tc(VII) and Re(VII) was shown to proceed to Tc(V)/(VI) and Re(V)/(VI) states (fast stages). Simultaneously, formation of Tc(IV) and Re(IV) (slow stages) took place. Reduction of TcO_4^- and ReO_4^- occurs through "nucleus" of ferrocene (in which Fe(II) oxidation state). These reactions have complicated stepwise character and proceed through the formation of Tc- and Re-containing ferricinium complexes in solution (donor-acceptor type) [1]. Reductive reactions of TcO_4^- and ReO_4^- by ferrocene are quite similar to each other. But the similarity does not exclude substantial differences, concerning such factors as rate and profundity of reduction process. The latter is connected with greater acceptor ability of rhenium atom. The process of ReO_4^- reduction can be accompanied by partial destruction of "sandwich" structures of ferricinium (Fe-Cp bond) [2]. In both cases was observed intermolecular electron transfer from molecule of ferrocene (donor) to the pertechnetate- and perrhenate ions (acceptor), respectively.

References

1. Grigoriev M.S., Kryutchkov S.V. *Radiochim Acta* 1993, v.63, p.187-193.
2. Maksimov V.G., Kryutchkov S.V. *J.Nucl.Biol.&Med.* 1994, v.38, No 3, p.418.