The aim of this study is to investigate the utility of adding chelating agent during hydrochloric acid leaching of low-grade scheelite concentrates, obtained from Uludag, Bursa (Türkiye). Examined parameters were as follows; leaching conditions, selective precipitation of tungsten salt from the acidic leach solution in which tungsten exists as heteropolytungstate, the optimum precipitation conditions, the possibility of obtaining pure and nano-sized tungsten salt. Chelating agent leaching of scheelite concentrates in acidic solutions involves fewer process steps as compared to the classical methods. Furthermore, this route enables production of pure WO$_3$ under prevalent conditions and without generating any spent liquor. The optimum leaching conditions were found to be 80°C, 2M HCl, 1/10 solid/liquid ratio, stirring speed of 900 min$^{-1}$ and W/PO$_4^{3-}$ weight ratio of 7/1. A tungsten leaching efficiency of 98% was reached under these conditions. It was also possible to selectively precipitate a pure (over 99%) tungstate salt, within minutes, from the polytungstate solution at 25°C by adding a “chelate breaking agent” at a NH$_4^+$/WO$_3$ weight ratio of >1/4.