Answer on Question #55700 - Chemistry - Physical chemistry

Question:

A silver electrode is immersed in a saturated Ag2SO4(aq).the potential difference between silver and standered hydrogen electrode is found to be 0.711V .determine Ksp(Ag2SO4).Given E0 Ag+/Ag=0.799V

Solution

$Ag_2SO_4 = 2Ag^+ + SO_4^{2-}$

$K_{sp}(Ag_2SO_4) = [Ag^+]^2[SO_4^{2-}]$

The potential difference between silver and standered hydrogen electrode is

$E = E^0 + (RT/F)ln[Ag^+]$

$0.711 = 0.799 + 0.0592log[Ag^+]$

$[Ag^+] = 0.033$

If the concentration of SO_4^{2-} is x then the concentration of $Ag^+$is 2x, or

$[SO_4^{2-}] = [Ag^+]/2 = 0.033/2 = 0.0165$

$K_{sp}(Ag_2SO_4) = (0.033^2)(0.0165) = 1.8x10^{-5}$

Answer: 1.8x10^{-5}