Question #50893, Chemistry, Physical Chemistry

What is Eo for the cell Ag l AgBr(s) l Br^- (a1), Fe^{3+} (a2), Fe^{2+} (a3) l Pt . Given : Standard half-cell reduction potentials as
AgBr l Ag, (Eo)1/2 = 0.0713 V, Fe^{3+} l Fe^{2+}, (Eo)1/2 = 0.771 V.
If a1 = 0.34, a2 = 0.1 & a3 = 0.02, then find Q, the reaction Quotient is Q = 0.588. Hence find E for the cell.

Answer:

$$E=E_o + \frac{0.592}{n}\lg(a_{ox}/a_{red})$$

$$E_1=0.0713 + 0.592*\lg(0.34) = -0.2 \text{ V} \quad n=1$$

$$E_2=0.771+ 0.592*\lg(0.02/0.1) = 0.357 \text{ V} \quad n=1$$

$$E=E_1-E_2= -0.2 – 0.357 = -0.557 \text{ V}$$