a solution is 0.1M in cl^-,0.01M in br^-,0.001M in I^-, agno3 is added to the solution [v mix=0].the concentration of ag+required to start precipitation of all 3 ions is [given,ksp of agcl is 10^-10,ksp of agbr is 10^-13,ksp of agI=10^-7]

Solution.

According to the assignment: $[Cl^-]=0.1$ M, $[Br^-]=0.01$ M, $[I^-]=0.001$ M.

$K_{sp}(AgCl)=10^{-10}$; $K_{sp}(AgBr)=10^{-13}$; $K_{sp}(AgI)=10^{-7}$.

$K_{sp}(AgCl)=[Ag^+]\times[Cl^-]=10^{-10}$; $[Ag^+]_1=\frac{K_{sp}}{[Cl^-]}=\frac{10^{-10}}{0.1}=10^{-9}$ M;

$K_{sp}(AgBr)=[Ag^+]\times[Br^-]=10^{-13}$; $[Ag^+]_2=\frac{K_{sp}}{[Br^-]}=\frac{10^{-13}}{0.01}=10^{-11}$ M;

$K_{sp}(AgI)=[Ag^+]\times[I^-]=10^{-7}$; $[Ag^+]_3=\frac{K_{sp}}{[I^-]}=\frac{10^{-7}}{0.001}=10^{-4}$ M;

$[Ag^+]=[Ag^+]_1+[Ag^+]_2+[Ag^+]_3=10^{-9}+10^{-11}+10^{-4}\approx10^{-4}$ M.

Answer: $\approx10^{-4}$ M