Answer on Question #63429, Chemistry / General Chemistry

Chapter 15 (15.92)

Consider the reaction $IO_4^-(aq)+2H_2O(l)\rightleftharpoons H_4IO_6^-(aq)$;$Kc=3.5\times10^{-2}$. If you start with 23.0 mL of a 0.903 M solution of $NaIO_4$, and then dilute it with water to 500.0 mL, what is the concentration of $H_4IO_6^-$at equilibrium? Express your answer to two significant figures and include the appropriate units.

Solution:

$C_1V_1 = C_2 V_2$
$C_2 = C_1V_1 / V_2 = (0.903\ M)(23\ mL) / (500\ mL) = 0.0415\ M = \text{initial } [IO_4^-]$

Molarity . . . . . $IO_4^- + 2H_2O <==> H_4IO_6^-$
Initial 0.0415 0
Change . . . . . .-x x
Final . . . . . 0.0415-x x

$Kc = [H_4IO_6^-] / [IO_4^-] = 0.035$
$(x) / (0.0415-x) = 0.035$
$x = (0.035)(0.0415-x)$
$x = 0.0015 - 0.035x$
$1.035x = 0.0015$
$x = 0.0014$

Answer: 0.0014