Homework Quiz #11A
solution outline

(a) The value of K_a for hydroiodic acid HI(aq) is 3×10^9. Calculate the pH and the pOH of 0.056 M HI(aq) in water.

HI is a strong acid $\Rightarrow$ complete dissociation

$\therefore$ 0.056 M HI(aq) $\Rightarrow$ 0.056 M $=$ [H$^+$] $=$ [I$^-$]

$\therefore$ pH $=$ $-\log_{10}$[H$^+$] $=$ $-\log_{10}$ 0.056 $=$ 1.25

$\because$ pOH + pH $=$ 14 $\Rightarrow$ pOH $=$ 12.75

(b) The fictitious compound, pandemonium carbonate (Pn$_2$CO$_3$), has a K_{sp} value in water of 3.091×10^{-9} at room temperature. Calculate the solubility of Pn$_2$CO$_3$ in water. Express your answer in units of molarity.

Pn$_2$CO$_3$ $=$ 2 Pn$^+$ + CO$_3^{2-}$

$\therefore$ K$_{sp}$ $=$ [Pn$^+$]^2[CO$_3^{2-}$], but [Pn$^+$] $=$ 2 [CO$_3^{2-}$] $=$ 2 c_S

$\therefore$ K$_{sp}$ $=$ (2 c_S)^2 c_S $=$ 4 c_S^3 $\therefore$ $c_S = \left(\dfrac{K_{sp}}{4} \right)^{1/3} = 9.18 \times 10^{-4} M$