10-10. Calc. conc. of NaOH, $V_{OH} = 22.63$ mL, added to 1.214 g HA (MM 207.29) dissolved in 41.37 mL H_2O. Solution pH = 9.24. Use Table 8-2 to find K_a of HA

$pK_{a(HA)} = 9.39$

Work: It does not say equivalence point, so we assume we are still in the buffer region (i.e. before eq. pt.)

	HA	+	OH^-	⟶	A^-	+	H_2O
mol Initial:	5.857×10^{-3} *		y		0		
Change:	−y		−y		+y		
Final mol:	$(5.857 \times 10^{-3} - y)$		0		y		

*Initial mol HA $= \frac{1.214\ g}{207.29\ g/mol} = 5.857 \times 10^{-3}$

Buffer: $pH = pK_a + \log\left(\frac{\text{mol } A^-}{\text{mol HA}}\right)$

$9.24 = 9.39 + \log\left(\frac{y}{5.857 \times 10^{-3} - y}\right)$

$10^{(9.24-9.39)} = \frac{y}{5.857 \times 10^{-3} - y} \Rightarrow (0.7079)(5.857 \times 10^{-3}) = y + 0.7079y$

Solving for y gives $y = 2.428 \times 10^{-3}$ mol A^- = mol OH^-

$[OH^-] = \frac{2.428 \times 10^{-3} \text{ mol } OH^-}{0.02263\ L} \Rightarrow [OH^-] = 0.107\ \frac{mol}{L}$

($0.02263\ L = V_{NaOH}$)