d) 2x initial moles of $HBrO$ = moles OH^-

moles OH^- = $2(0.004000\ mol) = 8.000 \times 10^{-3}\ mol$

$$[OH^-] = \frac{\text{moles } OH^- \text{ unreacted}}{\text{total volume}} = \frac{8.000\times10^{-3} - 4.000\times10^{-3}}{0.02000 + 0.08000L}$$

(reacted w/ 4.000×10^{-3} mol $HBrO$)

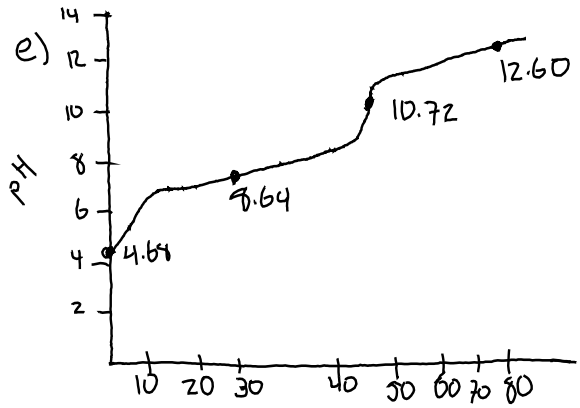
(40 mL (to endpoint) + 40 mL (extra 4.000×10^{-3} moles))

$$= \frac{4.000\times10^{-3}\ mol}{0.10000L} = 0.04000\ M$$

$$[H_3O^+] = \frac{K_w}{[OH^-]} = \frac{1.0\times10^{-14}}{0.04000\ M} = 2.5\times10^{-13}\ M$$

pH = 12.60

e)



drawn to horrible scale... ☹