

Examples: Strong acids and bases

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Step 1. Calculate dilutions. First add the volumes

$$\text{Total volume} = 25 \text{ mL} + 15 \text{ mL} = 40 \text{ mL}$$

Calculate concentrations in the solution

$$[\text{HClO}_4] = [0.25] \left(\frac{15}{40} \right) = 0.0937 \text{ M}$$

$$[\text{NaOH}] = [0.20] \left(\frac{25}{40} \right) = 0.125 \text{ M}$$

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Step 2. Write a balanced chemical reaction for the limiting rxn.



Species	HClO_4	NaOH	Na^+	ClO_4^-
Initial	0.0937	0.125	0.0	0.0
Difference	-0.0937	-0.0937	0.0937	0.0937
Final	0.0	0.0313	0.0937	0.0937

Excess rxn is



Species	NaOH	Na^+	OH^-
Initial	0.0313	0.0	0.0
Final	0.0	0.0313	0.0313

$$pOH = -\log_{10}(0.0313) = 1.50$$

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Step 3. Calculate the pH from the pOH.

$$\text{pH} = 14 - \text{pOH} = 14 - 1.5$$

$$\text{pH} = 12.5$$