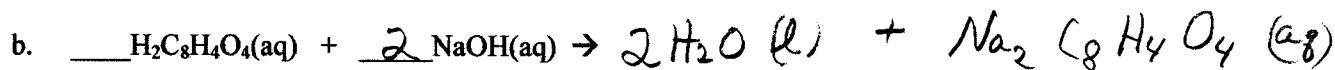
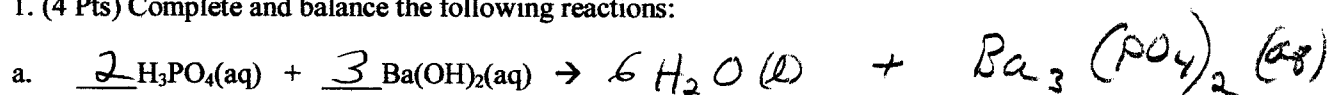


Show all setups.

1. (4 Pts) Complete and balance the following reactions:



2. (12 Pts) Determine the pH, pOH, $[\text{H}^+]$, and $[\text{OH}^-]$ of each of the following:

a. A 0.0010 M HNO_3 solution strong acid

$$[\text{H}^+] = 0.0010$$

$$[\text{OH}^-] = 10^{-14} / 0.0010 = 1 \times 10^{-11}$$

$$\text{pH} = -\log 0.0010 = 3.00$$

$$\text{pOH} = 11.00$$

b. A solution that is 2.9×10^{-2} M in HCl Strong Acid

$$[\text{H}^+] = 2.9 \times 10^{-2}$$

$$[\text{OH}^-] = 10^{-14} / 2.9 \times 10^{-2} = 3.45 \times 10^{-13}$$

$$\text{pH} = -\log 2.9 \times 10^{-2} = 1.537$$

$$\text{pOH} = 12.46$$

c. A solution that contains 1.52 g of HNO_3 in 575 mL of solution.

$$\frac{1.52 \text{ g HNO}_3}{63.02 \text{ g/mol}} \div \frac{575 \times 10^{-3} \text{ L}}{1000 \text{ mL}} = 0.0419 \text{ M HNO}_3$$

$$[\text{H}^+] = 0.0419 \quad \text{pH} = 1.38 \quad [\text{OH}^-] = 2.29 \times 10^{-13} \quad \text{pOH} = 12.62$$

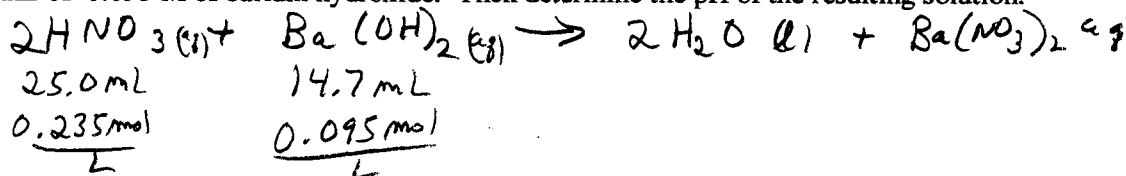
d. A solution that is prepared by mixing 10.0 mL of 0.100 M HBr with 20.0 mL of 0.200 M HCl.

Both Strong Acids

$$\left(\frac{10.0 \text{ mL}}{1000 \text{ mL}} \times 0.100 \text{ mol H}^+ \right) + \left(\frac{20.0 \text{ mL}}{1000 \text{ mL}} \times 0.200 \text{ mol H}^+ \right) \div 0.030 \text{ L} = 0.167 \text{ M H}^+$$

$$\text{pH} = 0.778 \quad [\text{OH}^-] = 6 \times 10^{-14} \quad \text{pOH} = 13.22$$

3. (9 Pts) Determine concentration of the excess reactant when 25.0 mL of 0.235 M nitric acid is reacted with 14.7 mL of 0.095 M of barium hydroxide. Then determine the pH of the resulting solution.



$$\text{Find mole H}^+: \frac{25.0 \text{ mL}}{1000 \text{ mL}} \times 0.235 \text{ mol HNO}_3 \times \frac{1 \text{ mol H}^+}{1 \text{ mol HNO}_3} = 0.005875 \text{ mol H}^+$$

$$\text{Find moles OH}^-: \frac{14.7 \text{ mL}}{1000 \text{ mL}} \times 0.095 \text{ mol Ba}(\text{OH})_2 \times \frac{2 \text{ mol OH}^-}{1 \text{ mol Ba}(\text{OH})_2} = 0.002793 \text{ mol OH}^-$$

$$\text{subtraction gives mole of XS H}^+ = 0.003082 \text{ mol XS H}^+$$

$$\text{then } [\text{H}^+] = \frac{0.003082 \text{ mol H}^+}{39.7 \times 10^{-3} \text{ L}} = 0.0776 \text{ M H}^+ \quad \text{pH} = 1.11$$