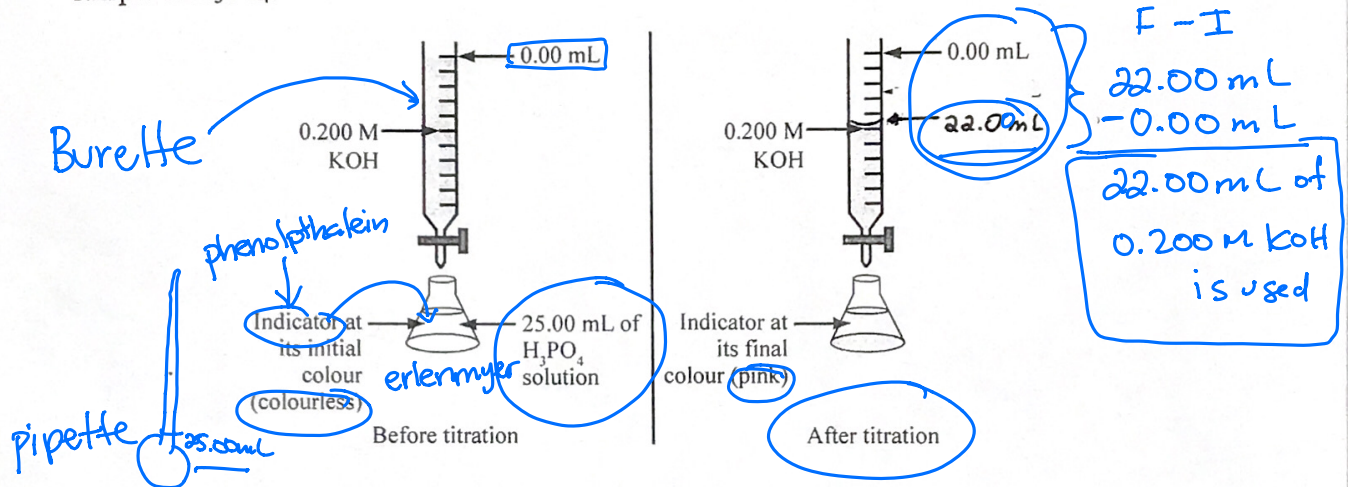


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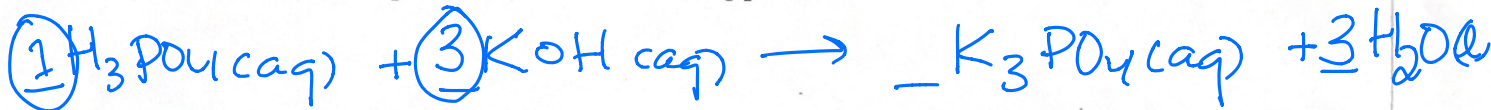
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**Chemistry 11
Titration Problems**

1. In a titration experiment, 25.00 mL of a solution of phosphoric acid (H_3PO_4) is titrated with 0.200 M KOH solution. It requires 22.00 mL of the 0.200 M KOH standard solution to titrate the 25.00 mL sample of H_3PO_4 .



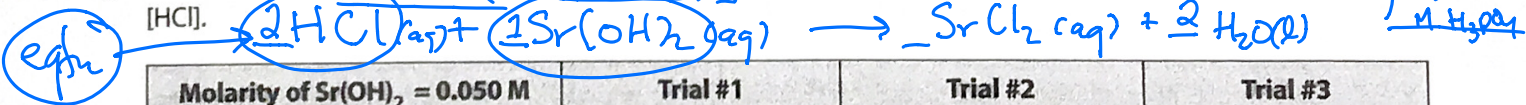
- a) Write a balanced equation for the reaction taking place in this titration.



- b) Calculate $[H_3PO_4]$ in the original sample solution.

$$\textcircled{22.00 \text{ mL}} \left(\frac{1 \cdot 10^{-3} \text{ L}}{1 \text{ mL}} \right) \left(\frac{0.200 \text{ mol KOH}}{1 \text{ L}} \right) \left(\frac{1 \text{ mol } H_3PO_4}{3 \text{ mol KOH}} \right) \left(\frac{1}{\textcircled{25.00 \text{ mL}}} \right) \left(\frac{1 \text{ mL}}{1 \cdot 10^{-3} \text{ L}} \right)$$

2. A student titrated 10.00 mL HCl with 0.050 M $Sr(OH)_2$. The table below shows the data collected. Calculate the $[HCl]$.



Molarity of $Sr(OH)_2 = 0.050 \text{ M}$	Trial #1	Trial #2	Trial #3
Initial burette reading (mL)	0.00 mL	16.05	32.93
Final burette reading (mL)	16.05 mL	32.93	49.68
Volume of $Sr(OH)_2$ added (mL)	16.05 - 0.00 mL 16.05 mL	32.93 - 16.05 16.88 mL	49.68 - 32.93 16.75 mL
Average volume $Sr(OH)_2$ (mL)	16.88 + 16.75 ÷ 2 = 16.82 mL		

base } F-I

$$\textcircled{16.82 \text{ mL}} \left(\frac{1 \cdot 10^{-3} \text{ L}}{1 \text{ mL}} \right) \left(\frac{0.050 \text{ mol } Sr(OH)_2}{1 \text{ L}} \right) \left(\frac{2 \text{ mol HCl}}{1 \text{ mol } Sr(OH)_2} \right) \left(\frac{1}{\textcircled{10.00 \text{ mL}}} \right) \left(\frac{1 \text{ mL}}{1 \cdot 10^{-3} \text{ L}} \right)$$

$$= \boxed{0.17 \text{ M HCl}}$$