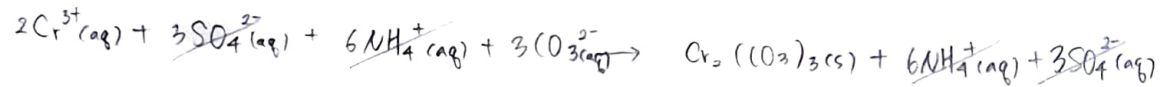
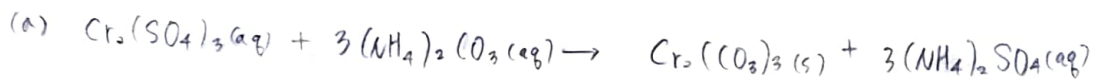
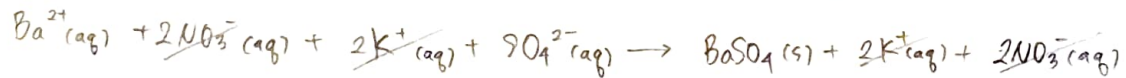
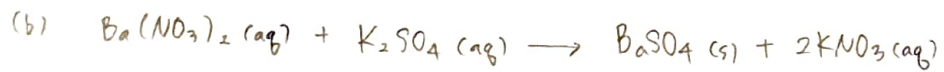


-1, 26



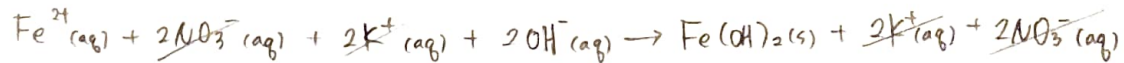
net ionic equations: $2\text{Cr}^{3+}(\text{aq}) + 3\text{CO}_3^{2-}(\text{aq}) \rightarrow \text{Cr}_2(\text{CO}_3)_3(\text{s})$

Spectator ions: SO_4^{2-} , NH_4^+



net ionic equation: $\text{Ba}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{BaSO}_4(\text{s})$

spectator ions: NO_3^- , K^+

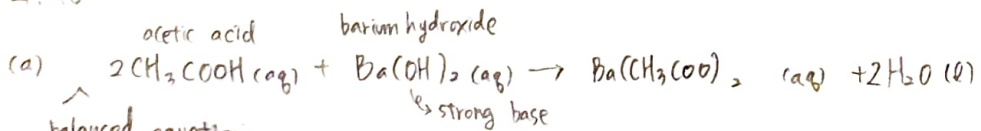


net ionic equation: $\text{Fe}^{2+}(\text{aq}) + 2\text{OH}^{-}(\text{aq}) \rightarrow \text{Fe}(\text{OH})_2(\text{s})$

spectator ions: NO_3^- , K^+

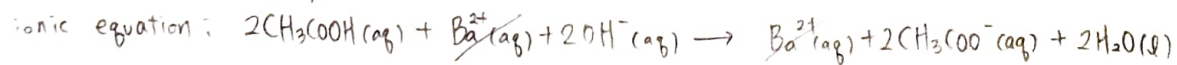
4.40

acetic acid barium hydroxide



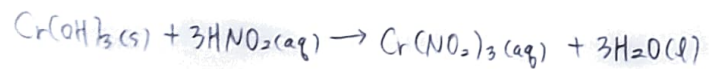
balanced equation:

↗ weak acid

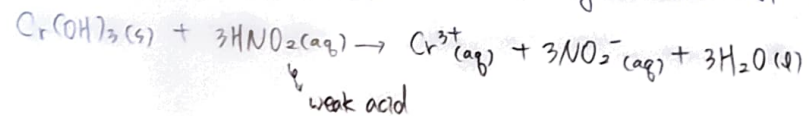


net ionic equation: $\text{CH}_3\text{COOH}(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{CH}_3\text{COO}^-(\text{aq}) + \text{H}_2\text{O}(\ell)$

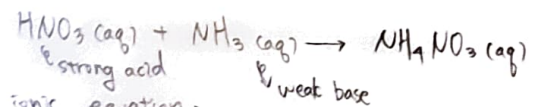
balanced molecular equation:



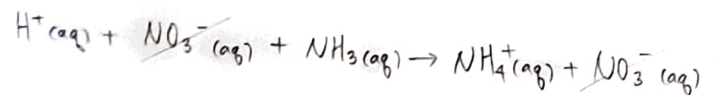
ionic equation & net ionic equation (nothing is crossed out from the ionic equation)



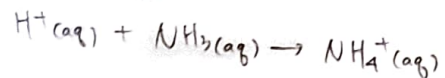
(c) balanced molecular equation:



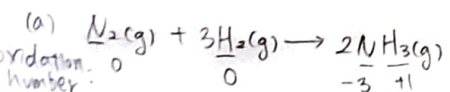
ionic equation:



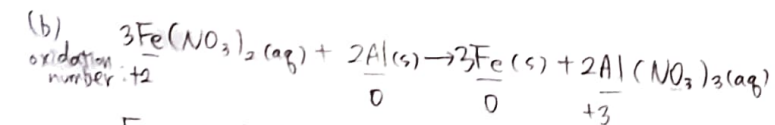
net ionic equation:



4.51

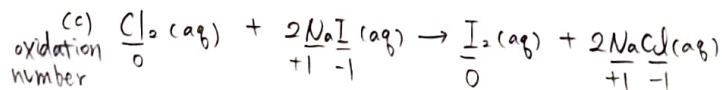


\therefore H is oxidized, N is reduced



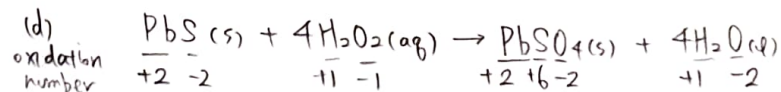
Fe reduced from +2 to 0, Al oxidized from 0 to +3

\therefore Al is oxidized, Fe is reduced



Cl reduced from 0 to -1, I oxidized from -1 to 0.

\therefore I is oxidized, Cl is reduced



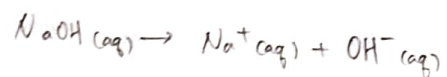
S oxidized from -2 to +6, O reduced from -1 to -2

\therefore S is oxidized, O is reduced

4.72.

$$(a) \text{ moles NaOH} = 42.0 \text{ mL soln} \times \frac{1 \text{ L soln}}{1000 \text{ mL soln}} \times \frac{0.170 \text{ mol NaOH}}{1 \text{ L soln}} + 37.6 \text{ mL soln} \times \frac{1 \text{ L soln}}{1000 \text{ mL soln}} \times \frac{0.400 \text{ mol NaOH}}{1 \text{ L soln}}$$

$$= 7.14 \times 10^{-3} \text{ mol NaOH} + 15.04 \times 10^{-3} \text{ mol NaOH} = 22.18 \times 10^{-3} \text{ mol NaOH}$$

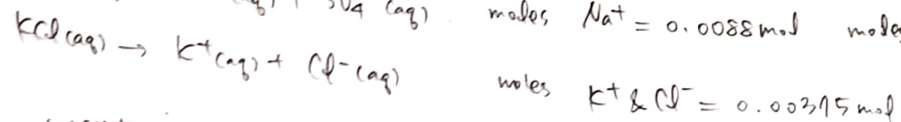
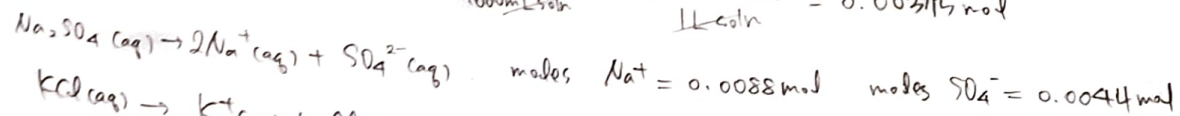


moles of Na^+ & OH^- is same as NaOH. $42.0 \text{ mL} + 37.6 \text{ mL} = 0.0796 \text{ L}$

$$\text{concentration Na}^+ \& \text{OH}^- = \frac{0.02218 \text{ mol}}{0.0796 \text{ L}} = 0.2786 \text{ M}$$

$$(b) \text{ moles Na}_2\text{SO}_4 = 44.0 \text{ mL soln} \times \frac{1 \text{ L soln}}{1000 \text{ mL soln}} \times \frac{0.100 \text{ mol Na}_2\text{SO}_4}{1 \text{ L soln}} = 0.0044 \text{ mol}$$

$$\text{moles KCl} = 25.0 \text{ mL soln} \times \frac{1 \text{ L soln}}{1000 \text{ mL soln}} \times \frac{0.150 \text{ mol KCl}}{1 \text{ L soln}} = 0.00375 \text{ mol}$$



$$\text{concentration Na}^+ = \frac{0.0088 \text{ mol}}{0.069 \text{ L}} = 0.13 \text{ M}$$

$$\text{concentration SO}_4^{2-} = \frac{0.0044 \text{ mol}}{0.069 \text{ L}} = 0.064 \text{ M}$$

$$\text{concentration K}^+ \& \text{Cl}^- = \frac{0.00375 \text{ mol}}{0.069 \text{ L}} = 0.054 \text{ M}$$

$$(b) \frac{7.60 \text{ g KCl}}{75.0 \text{ mL}} \times \frac{1 \text{ mol KCl}}{74.55 \text{ g KCl}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = 0.644 \text{ M}$$



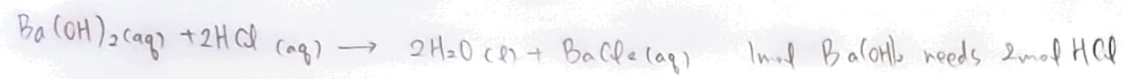
$$\text{concentration K}^+ = 0.644 \text{ M}$$

$$\text{concentration Ca}^{2+} = 0.250 \text{ M}$$

$$\text{concentration Cl}^- = 0.250 \text{ M} \times 2 + 0.644 \text{ M} = 1.144 \text{ M}$$

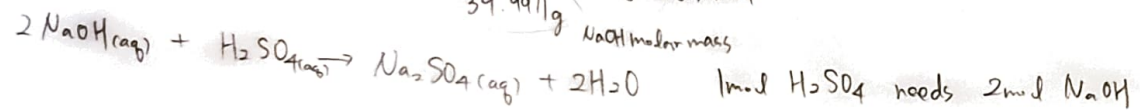
-1.82

(a) moles $\text{Ba}(\text{OH})_2 = 50.0 \text{ mL} \times \frac{1\text{L}}{1000\text{mL}} \times \frac{0.101 \text{ mol}}{1\text{L}} = 0.00505 \text{ mol}$



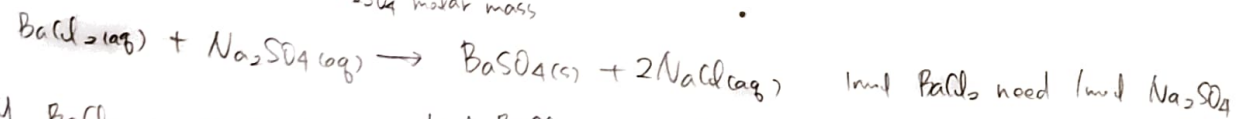
$$\text{mL HCl} = \frac{0.00505 \text{ mol} \times 2}{0.120 \text{ M} \left(\frac{\text{mol}}{\text{L}} \right)} \times \frac{1000 \text{ mL}}{1\text{L}} = 84.17 \text{ mL}$$

(b) moles $\text{NaOH} = 0.200 \text{ g} \times \frac{1 \text{ mol}}{39.997 \text{ g}} = 0.005 \text{ mol}$
NaOH molar mass



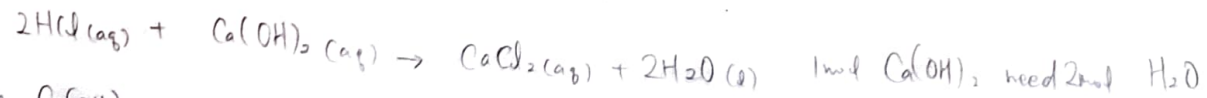
$$\text{mL H}_2\text{SO}_4 = 0.00505 \text{ mol} \times \frac{1 \text{ mol H}_2\text{SO}_4}{2 \text{ mol NaOH}} \times \frac{1\text{L}}{0.125 \text{ mol/L}} \times \frac{1000 \text{ mL}}{1\text{L}} = 20.0 \text{ mL}$$

(c) moles $\text{Na}_2\text{SO}_4 = \frac{0.752 \text{ g}}{142.04 \text{ g}} = 0.00529 \text{ mol}$
 Na_2SO_4 molar mass



$$\text{M BaCl}_2 = 0.00529 \text{ mol} \times \frac{1 \text{ mol BaCl}_2}{1 \text{ mol Na}_2\text{SO}_4} \times \frac{1}{0.0558 \text{ L}} = 0.0948 \text{ M}$$

(d) moles $\text{HCl} = 42.7 \text{ mL} \times \frac{1\text{L}}{1000\text{mL}} \times \frac{0.208 \text{ mol}}{1\text{L}} = 0.00888 \text{ mol}$



$$\text{gram Ca}(\text{OH})_2 = 0.00888 \text{ mol} \times \frac{1 \text{ mol Ca}(\text{OH})_2}{2 \text{ mol HCl}} \times \frac{74.093 \text{ g}}{1 \text{ mol}} = 0.329 \text{ g}$$