$$\text{Molarity} = \frac{\text{mol solute}}{\text{L soln}}$$

concentration, M, $\frac{mol}{L}$, $mol\,L^{-1}$, [ ]

Dilutions

mols solute before dilution = mols solute after dilution

$$\boxed{M_1V_1 = M_2V_2}$$

1) $\frac{11.5\text{ g NaOH}}{} \Big| \frac{1\text{ mol NaOH}}{40\text{ g NaOH}} = 0.288\text{ mol NaOH}$

$$M = \frac{\text{mols NaOH}}{\text{L soln}} = \frac{0.288\text{ mol NaOH}}{1.50\text{ L}} = \boxed{0.192\text{ M NaOH}}$$

2) 0.50 M $Co(NO_3)_2$

a) $Co(NO_3)_{2(s)} \xrightarrow{H_2O} Co^{2+}_{(aq)} + 2NO_3^-{}_{(aq)}$

$[Co^{2+}] = 1 \times 0.50\text{ M} = \boxed{0.50\text{ M } Co^{2+}}$

$[NO_3^-] = 2 \times 0.50\text{ M} = \boxed{1.0\text{ M } NO_3^-}$

2b) 1 M $Fe(ClO_4)_3$

$$Fe(ClO_4)_{3(s)} \xrightarrow{H_2O} Fe^{3+}_{(aq)} + 3ClO_4^-{}_{(aq)}$$

$[Fe^{3+}] = 1 \times 1M = \boxed{1\ M\ Fe^{3+}}$

$[ClO_4^-] = 3 \times 1M = \boxed{3\ M\ ClO_4^-}$

3) $$ZnCl_{2(s)} \xrightarrow{H_2O} Zn^{2+}_{(aq)} + 2Cl^-_{(aq)}$$

$[Cl^-] = 2 \times (1.0 \times 10^{-3} M) = 2.0 \times 10^{-3}\ M\ Cl^-$

$mol = M \times L = (2.0 \times 10^{-3} M)(1.75 L) = \boxed{3.5 \times 10^{-3}\ mol\ Cl^-}$

4) $$\frac{1.0\ mg\ NaCl}{} \left| \frac{1\ g\ NaCl}{1000\ mg\ NaCl} \right| \frac{1\ mol\ NaCl}{58.44\ g\ NaCl} = 1.7 \times 10^{-5}\ mol\ NaCl$$

$$M = \frac{mol\ NaCl}{L\ soln}$$

$$\therefore L = \frac{mol\ NaCl}{M} = \frac{1.7 \times 10^{-5}\ mol\ NaCl}{0.14\ M\ NaCl}$$

$$= 1.2 \times 10^{-4} L = \boxed{0.12\ mL}$$

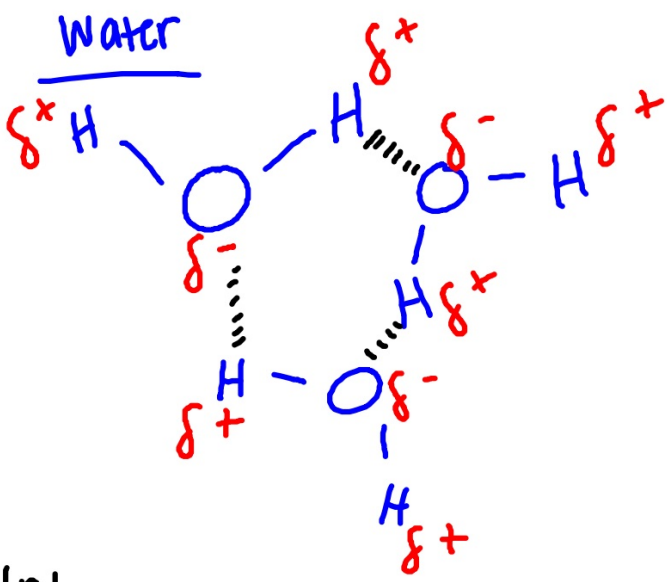
5) $mol = M \times L = (0.200M\ K_2Cr_2O_7)(1.00L) = 0.200\ mol\ K_2Cr_2O_7$

$$\frac{0.200\ mol\ K_2Cr_2O_7 \mid 294.20\ g\ K_2Cr_2O_7}{\mid 1\ mol\ K_2Cr_2O_7} = \boxed{58.8\ g\ K_2Cr_2O_7}$$

6) $M_1V_1 = M_2V_2$

$(16\ M)\ V_1 = (0.10\ M)(1.5\ L)$

$$\boxed{V_1 = 9.4 \times 10^{-3}\ L}$$



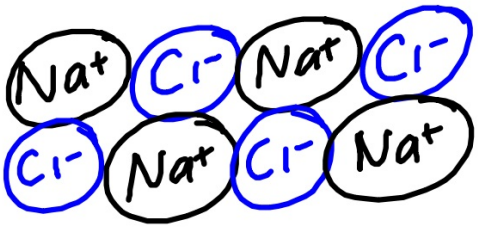
Bond H-O is polar b/c O is more electronegative

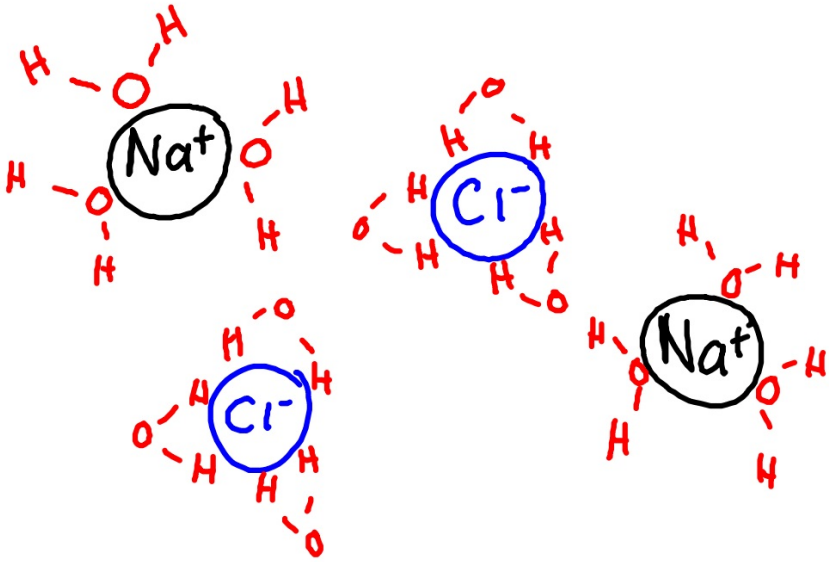
H_2O is a polar molecule b/c positive end & neg. end.

Intermolecular force (IMF) = attraction btwn molecules.

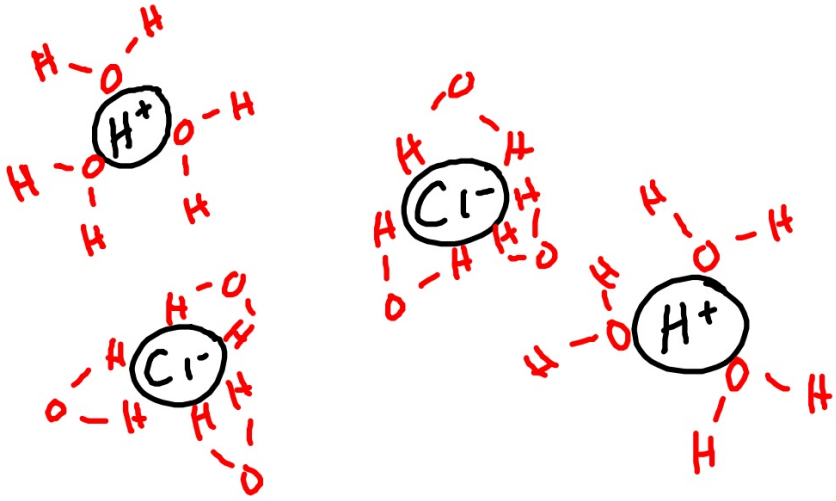
H_2O has H-bonding

NaCl

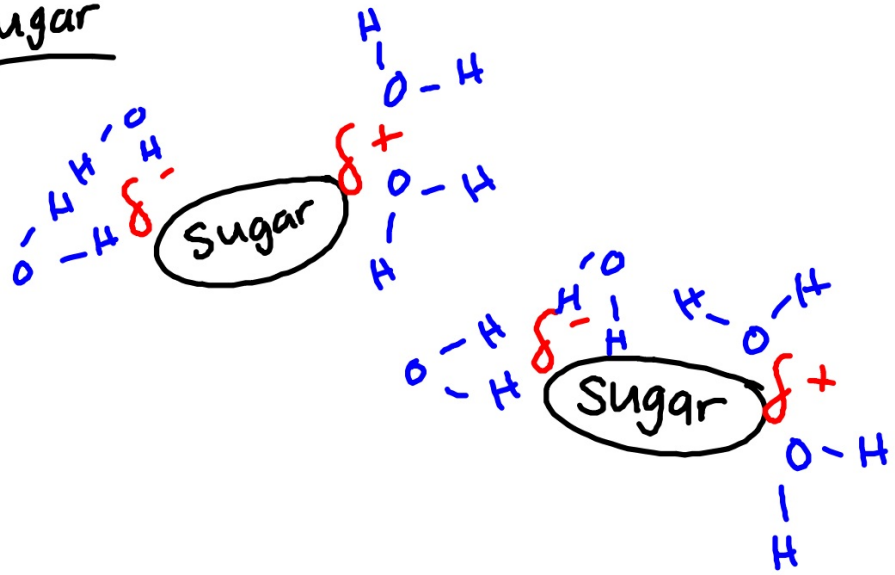




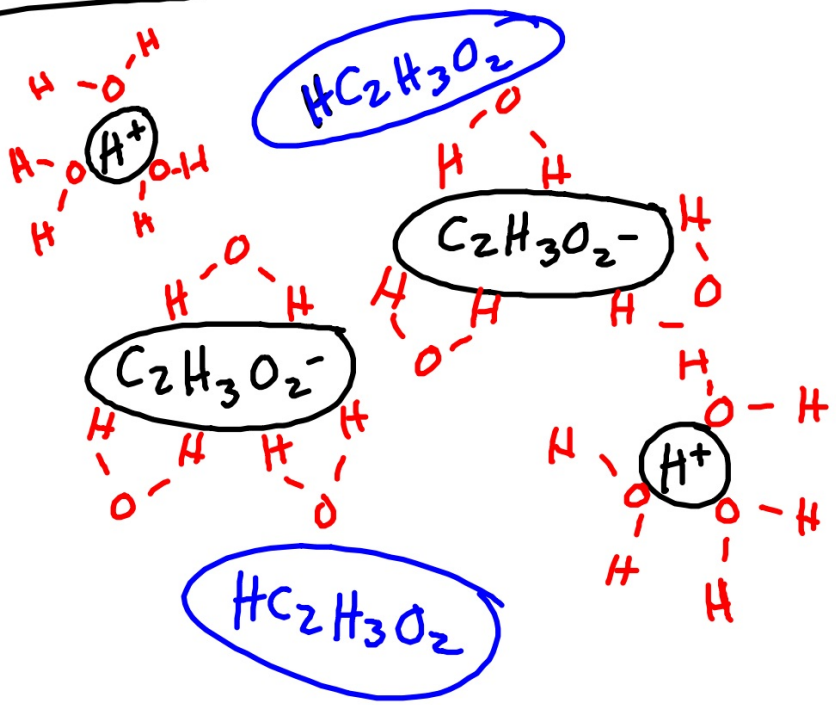
HCl



sugar



$HC_2H_3O_2$



Conclusion:

More ions in solution result in a stronger electrolyte.

Electrolyte – conducts electricity in soln.

- Strong electrolyte examples: - soluble salts (ionic cmpds)
  - Strong acids - HCl, HBr, HI, HNO_3, H_2SO_4, $HClO_4$
  - strong bases - $NaOH$, $LiOH$, KOH, $RbOH$, $CsOH$, $Ca(OH)_2$, $Ba(OH)_2$, $Sr(OH)_2$
- Weak electrolyte examples:
  - weak acids
  - weak bases - typically contain N (ex. NH_3)

Nonelectrolyte –

Do not conduct electricity in soln.

- Nonelectrolyte examples:

sugar, ethanol

★ Covalent cmpds (No ions)

Practice:

Name each substance then determine if it is a strong electrolyte, weak electrolyte, or nonelectrolyte.

1. $HNO_3(aq)$ nitric acid, strong
2. $LiClO_3(aq)$ lithium chlorate, strong
3. $C_{12}H_{22}O_{11}(aq)$ sugar, nonelectrolyte
4. $HF(aq)$ hydrofluoric acid, weak
5. $HC_2H_3O_2(aq)$ actetic acid (vinegar), weak