Lecture 29, p 2: Example:
Pure acetic acid (C₂H₃OOH), known as glacial acetic acid, is a liquid with a density of 1.049 g/mL at 25°C. Calculated the molarity of a solution of acetic acid made by dissolving 20.00 mL of glacial acetic acid in enough water to make 250.0 mL of solution.

molar mass of acetic acid: 60 g/mol
for initial glacial acetic acid:
\[ d = 1.049 \text{ g/mL} \quad v_{\text{initial}} = 20.0 \text{ mL} \]

for final acetic acid solution:
\[ v_{\text{final}} = (250.0 \text{ mL}) \left( \frac{1 \text{ L}}{1000 \text{ mL}} \right) = 0.250 \text{ L} \]

\[ [\text{acetic acid}] = \frac{? \text{ mol}}{0.250 \text{ L}} \leftrightarrow \text{units we want to end up with} \]

So, we only need to calculate the # mol of acetic acid (abbreviated below as "aa"). The only place that acetic acid is coming from is the 20.0 mL of the glacial acetic acid.

To find # mol of acetic acid:
\[ (20 \text{ mL aa}) \left( \frac{1.049 \text{ g aa}}{\text{mL aa}} \right) \left( \frac{1 \text{ mol aa}}{60 \text{ g aa}} \right) = 0.350 \text{ mol aa} \]

To find [acetic acid]:
\[ [\text{acetic acid}] = \frac{0.350 \text{ mol aa}}{0.250 \text{ L}} = 1.40 M \]
Review Lecture 8 (common ions) and the Chemical Nomenclature BST

Lecture 29, p 3: Examples:
Which of the following aqueous solutions has the greatest total concentration of ions? You need to identify what (if any) ions form and what type of electrolyte the compound is.

A. 0.2 M NH₄NO₃ strong electrolyte (ionic compound); solution will contain 0.2 M NH₄⁺ and 0.2 M NO₃⁻ for a total ion concentration of 0.4 M.

B. 0.2 M Pb(NO₃)₂ strong electrolyte (ionic compound); solution will contain 0.2 M Pb²⁺ and 0.4 M NO₃⁻ for a total ion concentration of 0.6 M.

C. 0.2 M Na₂SO₄ strong electrolyte (ionic compound); solution will contain 0.4 M Na⁺ and 0.2 M SO₄²⁻ for a total ion concentration of 0.6 M.

D. 0.2 M AlPO₄ strong electrolyte (ionic compound); solution will contain 0.2 M Al³⁺ and 0.2 M PO₄³⁻ for a total ion concentration of 0.4 M.

E. 0.2 M AlBr₃ strong electrolyte (ionic compound); solution will contain 0.2 M Al³⁺ and 0.6 M Br⁻ for a total ion concentration of 0.8 M. **this is the correct answer**

F. 0.2 M CH₃COOH (acetic acid) weak electrolyte (weak acid); solution will contain between 0.2 M C₂H₃OOH (if NOTHING dissociates) AND 0.2 M H⁺ and 0.2 M C₂H₃OO⁻ for a total ion concentration of 0.4 M (if EVERYTHING dissociates). Because this is an equilibrium, it will likely contain <0.4 M ion concentration.

Which of the following species is NOT an electrolyte in aqueous solution?

A. HCl
B. Rb₂SO₄
C. CH₃CH₂OH **this is the correct answer**
D. KOH
E. NaCl

Use the flowchart (which you need to get in your brain through practice) to identify that CH₃CH₂OH, an alcohol, is the nonelectrotye. The other choices are all strong acids or ionic compounds and are therefore strong electrolytes.
Review Lecture 8 (common ions) and the Chemical Nomenclature BST

Lecture 29, p 4 Examples:
Which one of the following solutions will have the greatest concentration of hydroxide ions?
Must be able to go from name to correct formula (and vice versa) and recognize what type of electrolyte.

A. 0.100 M rubidium hydroxide strong electrolyte (RbOH); \([\text{OH}^-] = 0.10 \text{ M}\)
B. 0.100 M magnesium hydroxide strong electrolyte (Mg(OH)\(_2\)); \([\text{OH}^-] = 0.20 \text{ M}\)
  this is the correct answer
C. 0.100 M ammonia (NH\(_3\)); \([\text{OH}^-] = 0.10 \text{ M}\) but \textit{only if} completely dissociated, hydroxide concentration will be much lower; this is a weak base = weak electrolyte, partial ionization
D. 0.100 M sodium hydroxide strong electrolyte (NaOH); \([\text{OH}^-] = 0.10 \text{ M}\)
E. 0.100 M hydrochloric acid strong electrolyte (HCl); \([\text{OH}^-] = 0 \text{ M}\)

A solution is prepared by dissolving calcium chloride in water and diluting to 300.0 mL. If this solution contains 66 ppm chloride ions, the concentration of calcium ions is ________ ppm.
Correct formula for calcium chloride is CaCl\(_2\). For every 2 Cl\(^-\) ions, there will be 1 Ca\(^{2+}\) ion. Thus, the solution will be 33 ppm Ca\(^{2+}\) ions.

A. 33 ppm  \textit{this is the correct answer}
B. 44 ppm
C. 66 ppm
D. 132 ppm