Monday, November 13

**Last Time:**
- Reading binary phase diagrams
- Lever-rule
- Introductory discussion of non-ideal systems: ouzo and water system

**Today:**
- Non-ideal systems & models
- Regular solution & miscibility gaps
- Eutectic phase diagrams

**Readings:**

**Handouts:**

**Reminders:**
- Exam 2 Model Solutions on Blackboard
Liquid Droplet Dispersions Formed by Homogeneous Liquid–Liquid Nucleation: “The Ouzo Effect”

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The “ouzo effect” enables one to create a dispersion of small droplets in a surrounding liquid phase without the use of surfactants, dispersing agents, or mechanical agitation: a phenomenon which can be of value in many disciplines. In the quantitative studies presented here, dispersions of oil droplets in water are formed by the addition of water to a solution of the oil dissolved in a solvent. This causes the oil to supersaturate and then nucleate into small droplets. The mean droplet diameter is a function only of the oil-to-solvent ratio at a given temperature. The number density of droplets formed can be controlled independently from the droplet diameter by changing the amount of water added. Smaller droplets are formed by using more hydrophilic cosolvents. The droplet size distribution is typically log–normal. The width of the distribution can be narrowed by mixing the components at an elevated temperature and then allowing the dispersion to cool.
Chemical Composition of Vintage Preban Absinthe with Special Reference to Thujone, Fenchone, Pinocamphone, Methanol, Copper, and Antimony Concentrations

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Thirteen samples of authentic absinthe dating from the preban era (i.e., prior to 1915) were analyzed for parameters that were hypothesized as contributing to the toxicity of the spirit, including naturally occurring herbal essences (thujone, pinocamphone, fenchone), methanol, higher alcohols, copper, and antimony. The total thujone content of preban absinthe was found to range between 0.5 and 48.3 mg/L, with an average concentration of 25.4 ± 20.3 mg/L and a median concentration of 33.3 mg/L. The authors conclude that the thujone concentration of preban absinthe was generally overestimated in the past. The analysis of postban (1915–1988) and modern commercial absinthes (2003–2006) showed that the encompassed thujone ranges of all absinthes are quite similar, disproving the supposition that a fundamental difference exists between preban and modern absinthes manufactured according to historical recipes. Analyses of pinocamphone, fenchone, base spirits, copper, and antimony were inconspicuous. All things considered, nothing besides ethanol was found in the absinthes that was able to explain the syndrome “absinthism”.

KEYWORDS: Absinthe; thujone; fenchone; pinocamphone; Artemisia absinthium L.; wormwood; copper; antimony; higher alcohols
\[ \Omega = 2000 \]

\[ \begin{array}{ccc}
T = 600 & T = 500 & T = 450 \\
T = 350 & T = 250 & T = 150 \\
\end{array} \]
Hexane-Nitrobenzene

Liquid Miscibility Gap
Binary Solid-Liquid Phase Diagram

- L
- 1455°C
- 1084.87°C
- (Cu,Ni)
- 354.5°C
- 85.5
- \(\alpha_1 + \alpha_2\)
- T_c
- 354.4°C

- Cu
- Weight Percent Nickel
- Ni
Interesting phase separation

![Diagram showing phase separation](image)

- Composition of one phase
- Composition of second phase

Temperature, $T$

Mole fraction of triethylamine, $x_{(C_2H_5)_3N}$

- $P=2$
- $P=1$

$T_{lo}$
Interesting phase separation
Solid solution Ag with some Cu

Solid solution Cu with some Ag
Ethylene Glycol and Water (Anti-freeze)

- **All liquid**
- **Liquid + ice**
- **Pure water**
- **“slush”**
- **Eutectic**: 68 vol% glycol, $T = -69^\circ C = -92^\circ F$
- **Pure glycol**

- **P=1**
- **P=2**

- **H$_2$O**
- **HO-CH$_2$-CH$_2$-OH**
Fe-”C” Phase Diagram

Eutectic

$L \rightarrow \gamma + Fe_3C$