

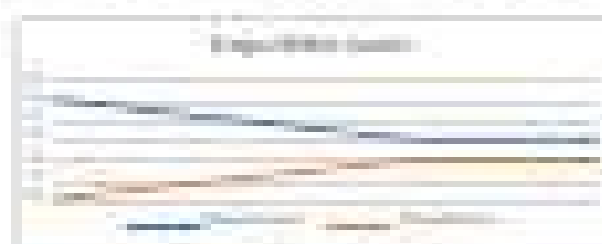
# CHEM 102 Exam 3 Study Guide

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## Lecture 10: Equilibrium introduction

- Equilibrium: a mixture that composition has stopped changing with time



- **Thermodynamic equilibrium conditions**

- Temperature, pressure, and both chemical potentials are constant
- No net change in macroscopic properties and processes
- Macroscopic is still changing microscopic level
- Not all systems reach equilibrium condition
- Equilibrium condition is a thermodynamic function of a system or subsystem
- A state macrofunction is a macroscopic condition

- Equilibrium reached if a system that gives response to the environment through processes

- Equilibrium is reached if a system is a macroscopic
- Probability of a state is given by  $P = \frac{1}{Z} e^{-\beta E}$  where  $\beta = \frac{1}{k_B T}$

State 1	State 2	State 3	State 4
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**Clemens Wendtner**



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