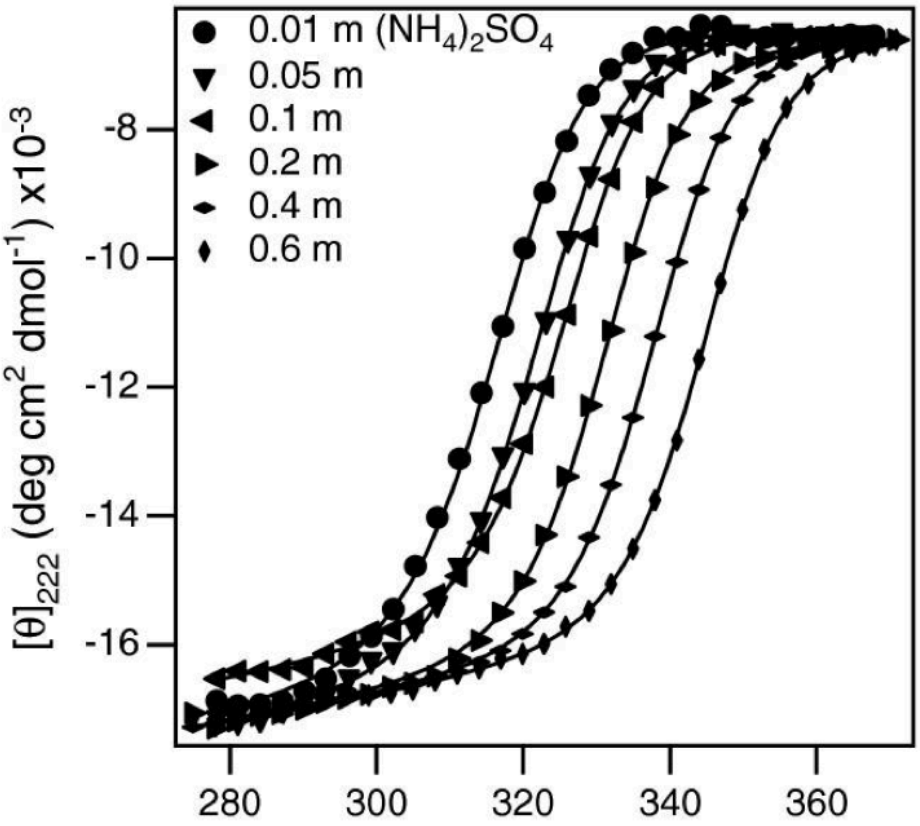
Circular dichroism (CD) can be used to detect protein secondary structures. The molar ellipticity of 222 nm light ($[\theta]_{222}$) becomes more negative as the amount of alpha-helices in a protein solution increases. This plot shows molar ellipticity vs. temperature in Kelvin for the DNA binding domain of *lac* repressor.



If you didn't drink milk for lunch, the *E. coli* within your gut are currently using *lac* repressor to shut down their system for metabolizing lactose. What fraction of the *lac* repressor DNA binding domains is folded at 37°C (310 K)? Assume the ammonium sulfate concentration is negligible (0.01 m). Show you work.

The melting temperature (T_m) is defined as the temperature at which the fraction of folded proteins is equal to the fraction of unfolded proteins. Determine the T_m in Kelvin at each different ammonium sulfate concentration.

$T_m^{0.01m} =$

$T_m^{0.05m} =$

$T_m^{0.1m} =$

$T_m^{0.2m} =$

$T_m^{0.4m} =$

$T_m^{0.6m} =$

Does ammonium sulfate increase or decrease the T_m?

Does ammonium sulfate increase or decrease the stability of a protein fold?

Articulate a hypothesis as to how you think ammonium sulfate may exact this effect at the molecular level.