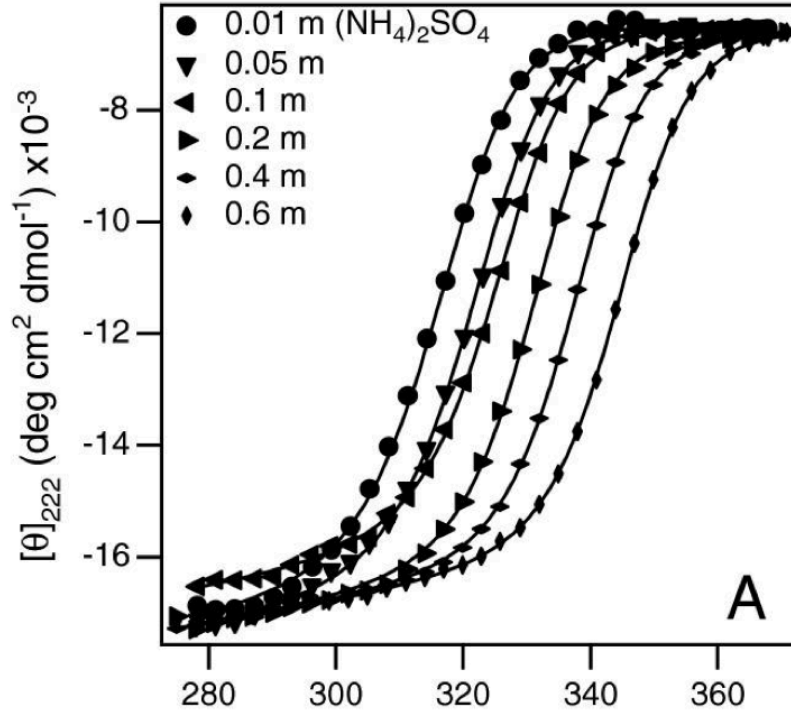


**Quiz 7**

NAME: \_\_\_\_\_

Circular dichroism (CD) can be used to detect protein secondary structures. The molar ellipticity of 222 nm light ( $[\theta]_{222}$ ; y-axis on graph below) increases as the amount of alpha-helices in a protein solution decreases. This plot shows molar ellipticity vs. temperature in Kelvin (x-axis) for the protein lac repressor.



1) 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; your body temperature)? Assume the ammonium sulfate concentration is negligible and equal to 0.01 m in your gut.

2) 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  $T_m$  at each different ammonium sulfate concentration.

$$T_m^{0.01m} =$$

$$T_m^{0.05m} =$$

$$T_m^{0.1m} =$$

$$T_m^{0.2m} =$$

$$T_m^{0.4m} =$$

$$T_m^{0.6m} =$$

3c.) Does ammonium sulfate increase or decrease the  $T_m$ ?

3d.) Does ammonium sulfate increase or decrease the stability of a protein fold?