What is the effect of accounting for potassium binding on estimation of

free magnesium ion?

When potassium binding is no longer considered (Kk\_ATP,Pi,ADP,CrP = infinity in the code, effectively making potassium 0) there is no change in the estimation of the free magnesium ion (1.227241082701891e-06 in both cases where potassium binding is and isn't considered). This is because the amount of magnesium binding does not rely on potassium because magnesium does not bind with the potassium.

How does potassium binding influence the apparent equilibrium

constant?

The apparent equilibrium constant increases by about 30 million (around 10% as we discussed in class). This is because equilibrium constants are a ratio of concentrations products and reactants in an equation, and since potassium has the ability to bind to those products and reactants (ATP, ADP, CrP and Pi) it does change the final ratio of products and reactants that are in the form we are interested in for our equilibrium constant.

My code produces the plot shown below which matches the solution given in class, but the solution is not exact match to what is in the book as far as where the dots fall on the y axis and their position on that axis relative to the line. The reason my code previous had the dots in a very incorrect spot (way too far to the right to be on the line) is a simple mistake that I discovered while comparing to the solution code. I gave most of my variables the necessary 1e-3 conversion but forgot to do so for the variables Pi and Tris, therefore my magnesium values were slightly off, affecting the location of the orange dots.

Chart, line chart

Description automatically generated