Some word choices: The changes in the kinetics in the presence of the inhibitor are often referred to as the "observed" Michaelis-Menton parameters. We can also discuss them as "apparent" Michaelis-Menton paramters.

If we just look at the final rate equation, since [S] is isolated, we should actually be able to see if the inhibitor affects k_{cat} and/or k_{cat}/K_M. As you can see, it does affect both, since neither term stands alone and unaffected.

To see this more explicitly:

1. I solved for k_{cat}, by going to the extreme limit of high [S]. in this case you can see the term for k_{cat} is affected by the inhibition term. In fact the *observed* k_{cat} (in the presence of the inhibitor) will be decreased (since the denominator of the inhibition term is greater than 1) relative to k_{cat} without the inhibitor.

2. When I solve for k_{cat}/K_M (by looking at the extreme of low [S]), I can have the illusion that neither the *observed* k_{cat} nor the *observed* K_M are affected by the inhibition – b/c the inhibition term cancels itself out by being in the numerator and the denominator. BUT….I know from #1 that the *observed* k_{cat} is lowered and see #3 next….

3. If I use kcat and k_{cat}/K_M to solve for K_M, however, I see that the *observed* K_M is in fact decreased by the presence of the inhibitor. You can note that the *observed* K_S is decreased by being multiplied by a factor that is greater than one in the denominator.

These derivation results are actually what we expected based on the reaction scheme at the top of the worksheet – kcat should be affected by the inhibitor b/c some of the ES complex is going towards ESI instead of product. Likewise, the equilibrium between free and bound E will be affected by the fact that some of the bound ES will be pulled to ESI.