

# Chemistry 2740 Spring 2022 Assignment 1

**Due:** Monday, May 2 at 9:00 a.m.

**Assignments submitted after that time will not be accepted unless there are extenuating circumstances.**

**Total marks:** 14

Sugar transporters often phosphorylate the sugar as it is being imported into the cell. This is the case for instance for the bacterial  $\text{EII}^{\text{Glc}}$  permease. Uptake and phosphorylation by these transporters can obey simple Michaelis-Menten kinetics, or more complex kinetics can be observed.

The following data were obtained for the phosphorylation of 3-fluoro-3-deoxy-D-glucose (3FGlc) by  $\text{EII}^{\text{Glc}}$ :

$[\text{3FGlc}]/\mu\text{mol L}^{-1}$	5371	2561	1259	632	313	156	78
$v/\mu\text{mol L}^{-1}\text{min}^{-1}$	53.6	48.5	43.1	34.6	24.5	15.4	8.4

1. Do these data fit the Michaelis-Menten rate law? Explain briefly how you came to your conclusion. [8 marks]
2. Regardless of your answer to the previous question, what values of  $v_{\text{max}}$  and  $K_M$  would you estimate? [4 marks]
3. Given that the concentration of the enzyme was  $15 \mu\text{mol L}^{-1}$ , what is the turnover number? [2 marks]