Quiz 6—Microbial Growth

CENG 340–Introduction to Environmental Engineering

Instructor: Deborah Sills, **15 November, 2013**

Name:

Environmental engineers use a mixed-order kinetic model (the Monod model), described by Eq.1 and presented in Fig. 1, to estimate the net growth rate of bacteria in biological treatment reactors.

$$\frac{dX}{dt} = \frac{\mu_{max} X S}{K_s + S} \tag{1}$$

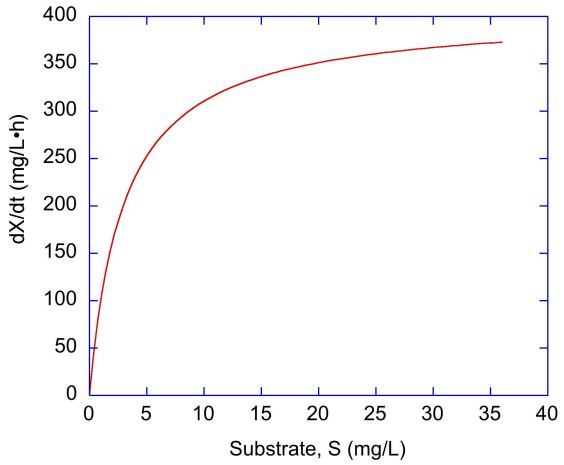

Figure 1: Net growth rate of microroganisms as a function of substrate concentration.

1. *(5 pts)* Describe very briefly under what conditions the growth rate ($\frac{dX}{dt}$) is zero order with respect to S, and write the resulting zero-order rate equation.

2. *(5 pts)* Describe very briefly under what conditions the growth rate ($\frac{dX}{dt}$) is first order with respect to S, and write the resulting first-order rate equation.