\[ \text{Ave} = 20.98 \pm 4.63 \text{ pts} \]

Name: [Key]
SSN: 

Pharmacy 319 Spring 1999
Quiz #2 April 16, 1999

Please circle final answers for questions. Each question is worth 5 points.

1. Will a weak acid such as phenobarbital (pKa = 7.2) have great difficulty crossing the biological membranes in the small intestine (pH 4 - 6)? (Yes or No) Why?

Majority of drug (99.37% to 100%) is un-ionized and should cross biological membranes easily.

\[ \text{pH} = \text{pKa} + \log \left( \frac{[A]}{[HA]} \right) \]

\[ \text{pH} = 4 \left(0.0063\% \text{ ionized}\right) \quad \text{pH} = 6 \left(0.63\% \text{ ionized}\right) \]

2. Calculate the half-life of a drug, when 32\% of the dose remains in the body 8 hours after an i.v. bolus dose.

\[ t_{1/2} = 0.693 \frac{\text{hr}}{k_d} \]

Fraction Remaining in Body \[ = e^{-kt} \]

\[ 0.32 = e^{-k_d (8\text{hr})} \]

\[ -1.139 = -k_d 8\text{hr} \]

\[ k_d = 0.142 \text{hr}^{-1} \]

3. The data given in the table below are the plasma concentrations of ticarcillin as a function of time after i.v. bolus administration of 5.0 gram ticarcillin.

<table>
<thead>
<tr>
<th>Time (hr)</th>
<th>0.25</th>
<th>0.5</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration (ug/mL)</td>
<td>320</td>
<td>270</td>
<td>200</td>
<td>106</td>
<td>60</td>
<td>32</td>
<td>17</td>
<td>9.3</td>
</tr>
</tbody>
</table>

a. Prepare a semi logarithmic plot of plasma concentration versus time. See graph.

b. Estimate the half-life of ticarcillin.

\[ t_{1/2} = \frac{0.693}{k_d} \]

\[ k_d = \ln \left( \frac{0.693}{0.570} \right) \]

\[ 6 - 0.5\text{ hr} \]

\[ k_d = 0.612 \text{hr}^{-1} \]

\[ t_{1/2} = 1.13 \text{ hr} = t_{1/2} \]

\[ \text{c. Estimate the total clearance (Clp) of ticarcillin.} \]

\[ \text{Clp} = \frac{\text{Dose}}{AUC} \]

\[ \text{Dose} = 5g \Rightarrow 5000 \text{mg} \]

\[ \text{AUC} = C_0 \frac{F}{k_d} = \frac{368 \text{ug/mL}}{0.612 \text{hr}^{-1}} = \text{601.3 mg/hr} \]

\[ \text{or} \Rightarrow 601.3 \text{mg/hr} \]

\[ \text{Clp} = 9.32 \text{L/hr} \]