Which species are found in buffered blood plasma (pH ~ 7.2)?

Cocaine  
\( \text{pK}_a = 8.6 \)

Arachidonic Acid, \( \text{pK}_a \approx 5.0 \)

The separation or organic compounds

Where is the amine?

Where is the carboxylic acid?

Where is digitoxigenin?

Which nitrogen atom in nicotine is the most basic?

Why?

\[
\begin{align*}
\text{nicotine} & \quad + \quad \text{H}^+ & \quad \rightarrow & \quad \text{A} \quad \text{or} \quad \text{B} \\
\text{pyrrolidine} & \quad + \quad \text{H}^+ & \quad \rightarrow & \quad \text{A} \\
\text{pyridine} & \quad + \quad \text{H}^+ & \quad \rightarrow & \quad \text{A}
\end{align*}
\]

Is nicotine (A) more or (B) less basic than pyrrolidine?

Why?

\[
\begin{align*}
\text{nicotine} & \quad + \quad \text{H}^+ & \quad \rightarrow & \quad \text{A} \\
\text{pyrrolidine} & \quad + \quad \text{H}^+ & \quad \rightarrow & \quad \text{A} \\
\text{pyridine} & \quad + \quad \text{H}^+ & \quad \rightarrow & \quad \text{A}
\end{align*}
\]
Is pyridine nitrogen in nicotine (A) more or (B) less basic than pyridine? Why?

<table>
<thead>
<tr>
<th>Compound</th>
<th>pKₐ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicotine</td>
<td>8.02</td>
</tr>
<tr>
<td>Pyridine</td>
<td>10.4</td>
</tr>
</tbody>
</table>

Which compound is more basic? Why?

\[
\text{CH}_3\text{N}^+\text{H}^+ \rightleftharpoons \text{CH}_3\text{N} \quad \quad \text{pK}_{\text{a}} = 10.81
\]

\[
\text{CH}_3\text{N} \rightleftharpoons \text{CH}_3\text{N}^+\text{H} \quad \quad \text{pK}_{\text{a}} = 0.63
\]

Weaker base, stronger acid.

Which nitrogen atom is more basic?

Which conjugate acid is more stable (less acidic)?

\[
\text{N}^+ \quad \text{No Other Structures}
\]

Which nitrogen atom is more basic?

\[
\text{N}^+ \quad \text{No Other Structures}
\]

How does the basicity of 1,5-diazabicyclo[4.3.0]non-5-ene (DBN) compare to other amines?

<table>
<thead>
<tr>
<th>Compound</th>
<th>pKₐ</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBN</td>
<td>13.5</td>
</tr>
<tr>
<td>piperidine</td>
<td>5.25</td>
</tr>
<tr>
<td>pyrrolidine</td>
<td>10.4</td>
</tr>
</tbody>
</table>
Which is the most basic position of arginine?

- pK_a = 13.5
- pK_a = 12.5
- pK_a = 9.0
- pK_a = 5.25
- pK_a = 10.4

Which nitrogen atom is the most basic?

- pK_a = 13.5
- pK_a = 12.5
- pK_a = 2.2
- pK_a = 10.4

Identify the stronger acid and base.

- H^+ + \text{(1)} \rightarrow \text{(2)} \quad pK_a = 10.66
- H^+ + \text{(3)} \rightarrow \text{(4)} \quad pK_a = 4.63

- (1) + (2)  
- (3) + (4)  
- (2) + (3)  
- (1) + (4)  
- (1) + (3)

Which compound is more basic?

Which of the following reaction sequences would not give the amine shown.

A (1) + (2)  
B (3) + (4)  
C (2) + (3)  
D (1) + (4)  
E (1) + (3)
How do these reactions occur?

\[
\begin{align*}
\text{H}_2\text{C} = \text{O} & \xrightarrow{\text{NH}_2} \text{H}_2\text{C} = \text{NH}_2 \\
\text{C}_6\text{H}_5\text{NH}_2 & \xrightarrow{\text{H}_2, \text{Ni}} \text{C}_6\text{H}_5\text{NH}_2 \\
\text{HO} - \text{NH}_2 & \xrightarrow{\text{H}^+} \text{HO} - \text{NH}_2 \\
\end{align*}
\]

How are amines prepared?

\[
\begin{align*}
\text{C}_6\text{H}_5\text{NH}_2, \text{pH} = 6 - 8 & \xrightarrow{\text{Na}^+} \text{C}_6\text{H}_5\text{NH}_2 \\
\text{H}^+ & \xrightarrow{\text{H} - \text{C} = \text{BN}} \text{H}^+ \\
\text{H} & \xrightarrow{\text{H} - \text{H} - \text{H}} \text{H} \\
\text{H} & \xrightarrow{\text{NH}_2} \text{H} \\
\end{align*}
\]

Why doesn't the C=O group react with the reducing agent?

\[
\begin{align*}
\text{H}_2\text{C} = \text{O} & \xrightarrow{\text{NaBH}_3\text{CN}} \text{H}_2\text{C} - \text{NH}_2 \\
\text{C}_6\text{H}_5\text{NH}_2 & \xrightarrow{\text{NaBH}_3\text{CN}} \text{C}_6\text{H}_5\text{NH}_2 \\
\text{N} & \xrightarrow{\text{N}} \text{N} \\
\end{align*}
\]

What is the product of the following reaction?

\[
\begin{align*}
\text{C}_6\text{H}_5\text{NH}_2 & \xrightarrow{\text{NaBH}_3\text{CN}} \text{C}_6\text{H}_5\text{NH}_2 \\
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What is the product of the following reaction?

\[
\begin{align*}
\text{C}_6\text{H}_5\text{NH}_2 & \xrightarrow{\text{NaBH}_3\text{CN}} \text{C}_6\text{H}_5\text{NH}_2 \\
\end{align*}
\]

AAB BC CD D