Principles of organic synthesis worksheet

Name:___________________

For each reaction in questions 1–3, add curly arrows to show the movement of electron pairs to produce the products shown. In question 3 add the other product of the reaction into the box.

1) \( \text{H} \text{O}^- \rightarrow \text{H}^+ \rightarrow \text{H} \text{O} \rightarrow \text{H} \text{O}^- \)  

(2 marks)

2) \( \text{Nu} \rightarrow \text{Nu} \rightarrow \text{Nu} \rightarrow \text{Nu} \)  

(5 marks)

3) \( \text{Br} \text{Br} \rightarrow \text{S} \rightarrow \text{Br} \text{S} \)  

(3 marks)

4) Ammonia is able to act as a nucleophile. When it reacts with a \( \text{H}^+ \) ion it forms an ammonium ion.

(a) Draw the shape of ammonia and of the ammonium ion. Indicate the bond angle(s)

<table>
<thead>
<tr>
<th>债券类型</th>
<th>Ammonia</th>
<th>Ammonium ion</th>
</tr>
</thead>
<tbody>
<tr>
<td>立方体</td>
<td></td>
<td></td>
</tr>
<tr>
<td>化学键 (s)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(4 marks)
(b) State how ammonia is able to act as a nucleophile

(c) Outline the mechanism by which ammonia reacts with a H⁺ ion to form the ammonium ion

For questions 5-8 draw the structures of the products formed in the boxes.