Most gold jewellery is not made of the pure metal, as it is too soft and often too expensive. Gold jewellery is usually made of an alloy. The metals added to gold can be cheaper than gold, like silver, copper and nickel, and so the alloy is less expensive. Sometimes a more expensive metal is added, e.g. palladium or platinum. Different alloys have different properties, depending on the amount and type of metal added. The properties that can be altered by making alloys include hardness, strength, malleability, resistance to corrosion and colour. The table shows the composition of some common alloys of gold.

<table>
<thead>
<tr>
<th>Gold alloy</th>
<th>pure gold</th>
<th>green gold</th>
<th>pink gold</th>
<th>red gold</th>
<th>dental gold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>100% gold</td>
<td>75% gold</td>
<td>37.5% gold</td>
<td>58.5% gold</td>
<td>75% gold</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15% silver</td>
<td>20% silver</td>
<td>7.5% silver</td>
<td>18% copper</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10% palladium</td>
<td>42.5% copper</td>
<td>34% copper</td>
<td>5% aluminum</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2% gallium</td>
</tr>
</tbody>
</table>

The purity of gold objects can be measured in carats. One carat is 1 part gold in 24 parts of alloy. So, pure gold is 24 carats and 12 carats is made of 50% gold.

The newer ‘fineness’ system measures purity in parts per thousand. In this system, pure gold is 1000 and an object made of 50% gold is 500. Note that in the ‘fineness’ system pure gold is often labelled 999 instead of 1000.

1. What is an alloy?
2. Give two possible reasons for using an alloy of gold rather than pure gold.
3. Which of the alloys in the table above would be:
   a. most expensive
   b. most likely to corrode?
   Explain your answers.
4. Why might you mix gold with a more expensive metal rather than a less expensive one?
5. a. What do dentists use gold for?
   b. What special properties would dental gold need to have?
6. The gold alloys in the table vary in purity. Which of the alloys could be described as:
   a. 9 carat
   b. 14 carat
   c. 18 carat
   d. 24 carat?
7. Calculate the purity of each of the gold alloys in the table using the ‘fineness’ system.
8. Use the data in the table to draw a bar chart that clearly shows the percentage of each metal in green gold, pure gold and red gold. (Remember to include names, units where needed and a key if it would be helpful.)