3 · Mass Relationships in Chemical Reactions

Use the spectrum below to answer questions 1-5.

1. Since the x-axis is labeled mass number (amu), what can we assume about the charge?
   Charge is +1

2. How many peaks are on the graph?
   7

3. What does each peak represent?
   Isotope

4. Which peak has the highest intensity? What does this tell you?
   202; present in the greatest amount (most frequently)

5. What element could have provided the above spectra?
   Mercury (Hg)

6. The mass spectrum of a sample of chromium shows four peaks. Use the data below to calculate the relative atomic mass of chromium in the sample. Give your answer to two decimal places.

<table>
<thead>
<tr>
<th>Mass</th>
<th>50</th>
<th>52</th>
<th>53</th>
<th>54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Abundance (%)</td>
<td>4.3</td>
<td>83.8</td>
<td>9.5</td>
<td>2.4</td>
</tr>
</tbody>
</table>

\[
50 (0.043) + 52 (0.838) + 53 (0.095) + 54 (0.024) = 52.069
\]
Figure 1 is part of the mass spectrum for a sample of chlorine. Use it to answer questions 1-5 below.

1. Label the x and y-axis of both mass spectra.
2. How many isotopes of chlorine are there?
3. What are their masses?
4. What is the relative abundance for each isotope?
   \[ \frac{35}{100} \times 100 = 35\% \quad 35\text{Cl} \]
   \[ \frac{37}{100} \times 100 = 37\% \quad 37\text{Cl} \]
5. What kind of element is chlorine?

Figure 2 is the complete spectrum for a sample of chlorine. Use it to answer questions 6-7.

6. Compare the numbers of the first two peaks to the last 3, what do you notice?
   *Last 3 are about double*

7. What could account for this?
   *Chlorine doesn't like to be alone, bonds to itself.*
   \[ 35 + 35 = 70 \quad 37 + 37 = 74 \]
   \[ 35\text{Cl} + 35\text{Cl} \quad 37\text{Cl} + 37\text{Cl} \quad 35\text{Cl} + 37\text{Cl} \]