CONCLUSION QUESTIONS

1. Nickel has six naturally occurring stable isotopes with the masses and abundances detailed in Table 6.

Table 6. Isotopes of Nickel

Isotope	Mass (amu)	Abundance (%)
^{58}Ni	57.935	68.077
^{59}Ni	—	Trace
^{60}Ni	59.931	26.223
^{61}Ni	60.936	1.14
^{62}Ni	61.928	3.634
^{64}Ni	63.928	0.926

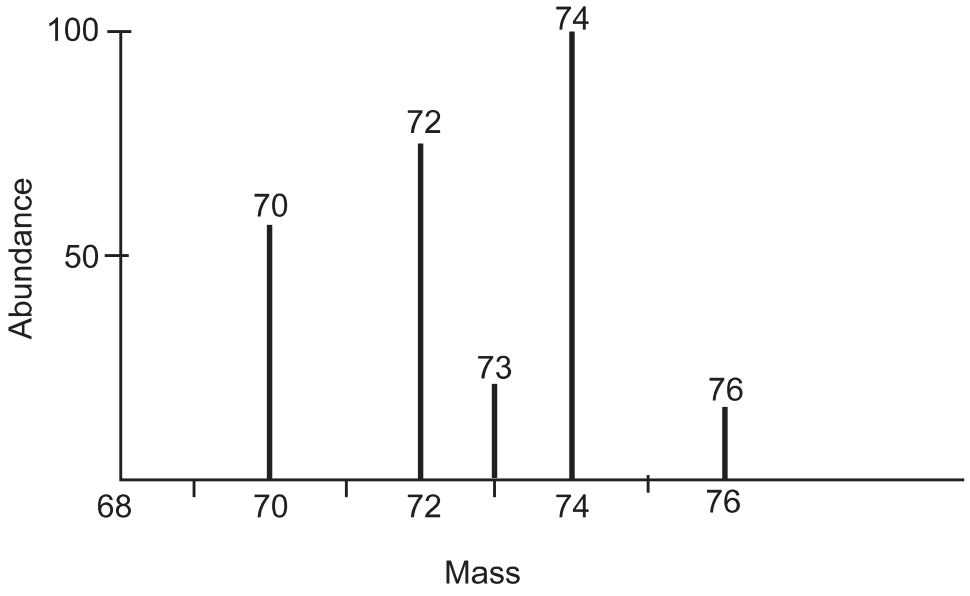
a. Calculate the average atomic mass of nickel.

b. Determine the number of neutrons in each isotope of nickel.

CONCLUSION QUESTIONS (CONTINUED)

2. Refer to the mass spectrum shown in Figure 7.

Figure 7. Mass spectrum



a. Which element is represented in this plot?

b. Write the name and symbol for each isotope.

c. What is the atomic mass of this element as shown on the periodic table?

d. Why is the periodic table's atomic mass not equivalent to the mass of the most abundant isotope as shown on the spectrum?

CONCLUSION QUESTIONS (CONTINUED)

3. Chlorine has two stable isotopes, ^{35}Cl and ^{37}Cl. The average atomic mass of chlorine is 35.45 amu.
   a. Which isotope is more abundant? Explain.

   b. Chlorine gas exists as a diatomic molecule, Cl_2. What are the three possible masses for a diatomic chlorine molecule? Explain.

4. Iridium has two naturally occurring isotopes whose masses are 190.961 and 192.963 amu. The average atomic mass of iridium is 192.217 amu.
   a. If the abundance of ^{191}Ir is considered to be x, write an expression in terms of x that describes the percent abundance of ^{193}Ir.

   b. Determine the percent abundance of each isotope, ^{191}Ir and ^{193}Ir.

CONCLUSION QUESTIONS (CONTINUED)

5. Consider the atomic species listed:

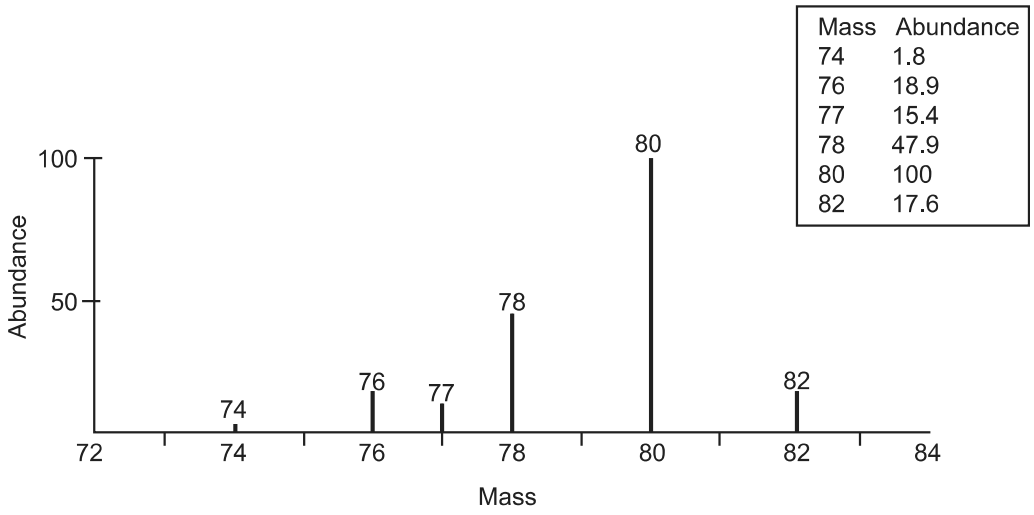
$^{100}_{42}X$ $^{100}_{44}X$ $^{92}_{42}X$ $^{96}_{40}X$ $^{100}_{44}X$ $^{98}_{42}X$ $^{96}_{42}X$

   a. Circle the species that are isotopes.

   b. Explain how you made your determination.

6. A student analyzes the mass spectrum shown in Figure 7 and claims that the average atomic mass of this element is 80.4 amu. Does the evidence support this claim? Justify your answer.

Figure 8. Mass spectrum



CONCLUSION QUESTIONS (CONTINUED)

7. Using colored beads as a model for the isotopic distribution of atoms has limitations. Identify at least one limitation of this model and discuss your reasoning.

8. How does the data offered by a mass spectrometer provide evidence that refutes Dalton's atomic theory? What modifications to his model are necessary to account for these findings?