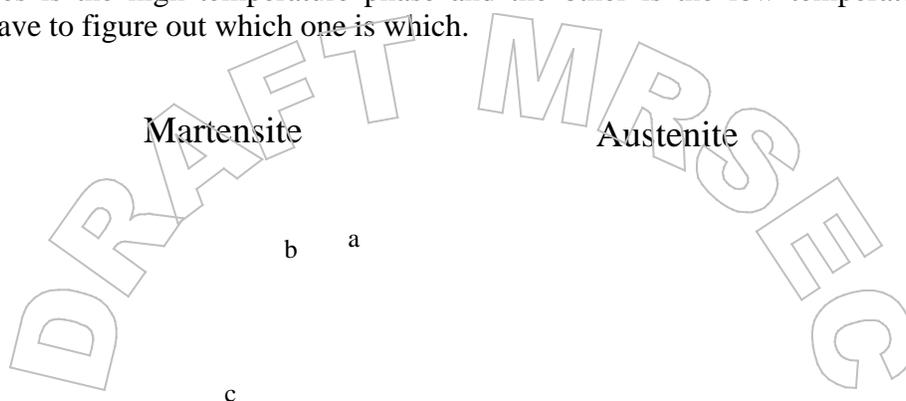


Investigation 2 Form and Function

In Investigation 1, you had the opportunity to observe how Nitinol behaves when heated and cooled. Scientists studying Nitinol have determined that there are two different phases of Nitinol, one is a high temperature phase and the other is a low temperature phase. In this investigation, you will use your observation skills to match the structures presented below with the phase at which that structure is found.

The structures below each show two unit cells. A unit cell is a small portion of a material's atomic structure. This unit cell can be repeated in all directions to show the full structure of the material. One analogy is to use 27 sugar cubes to build one larger cube. Another oversimplified analogy is a cob of corn. Each individual kernel of corn represents one unit cell of the structure. The basic kernel shape is repeated over and over again in regular patterns to form the entire cob of corn.

The diagram below shows the martensite and austenite phases of Nitinol. One of the phases is the high temperature phase and the other is the low temperature phase. You'll have to figure out which one is which.



a, b, and c are not equal,
is about 96°

CsCl Structure (cubic)
 $a = b = c$
 $= = = 90^\circ$

Key

Nickel

Titanium

1. As assigned by your teacher, build simple models of austenite and martensite. Use these model and/ or the diagrams above to answer the following questions.
2. Compare the models of austenite and martensite. How are their basic structures different?
3. Test the strength and flexibility of the martensite and austenite phase models. Which one is stronger? Which one is more flexible?
4. From what you have learned about these structures and by testing the strength of your models, which do you think would be the more flexible low temperature phase of the wire in Investigation 1? Explain.

DRAFT MRSE