Assignment #32

20.1 *A coil of wire 0.20 m long and having 200 turns carries a current of 10 A.*

(a) What is the magnitude of the magnetic field strength H?

(b) Compute the flux density B if the coil is in a vacuum.

(c) Compute the flux density inside a bar of chromium that is positioned within the coil. The susceptibility for chromium is given in Table 20.2.

(d) Compute the magnitude of the magnetization M.

20.5 *The magnetic flux density within a bar of some material is 0.435 tesla at an H field of* 3.44×10^5 *A/m. Compute the following for this material: (a) the magnetic permeability and (b) the magnetic susceptibility. (c) What type(s) of magnetism would you suggest is (are) being displayed by this material? Why?*

20.9 *Assume there exists some hypothetical metal that exhibits ferromagnetic behavior and that has (1) a simple cubic crystal structure (Figure 3.3), (2) an atomic radius of 0.153 nm, and (3) a saturation flux density of 0.76 tesla. Determine the number of Bohr magnetons per atom for this material.*

20.17 *A coil of wire 0.5 m long and having 20 turns carries a current of 1.0 A.*

(a) Compute the flux density if the coil is within a vacuum.

(b) A bar of an iron–silicon alloy, the B-H behavior for which is shown in Figure 20.29, is positioned within the coil. What is the flux density within this bar?

(c) Suppose that a bar of molybdenum is now situated within the coil. What current must be used to produce the same B field in the Mo as was produced in the iron–silicon alloy (part b) using 1.0 A?

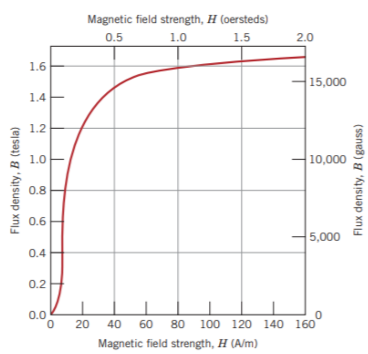

Figure 20.29 Initial magnetization *B*-versus-*H* curve for an iron–silicon alloy.