**PHYS 321 Intrinsic Semiconduction Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

18.18 *(a)**Using the data presented in Figure 18.16, determine the number of free electrons per atom for intrinsic germanium and silicon at room temperature (298 K). The densities for Ge and Si are 5.32 and 2.33 g/cm3, respectively.*

*(b)**Now explain the difference in these free-electron-per-atom values.*

18.19*For intrinsic semiconductors, the intrinsic carrier concentration ni depends on temperature as follows:*

 *(18.35a)*

*or, taking natural logarithms,*

 *(18.35b)*

*Thus, a plot of ln ni versus 1/T (K)–1 should be linear and yield a slope of –Eg/2k. Using this information and the data presented in Figure 18.16, determine the band gap energies for silicon and germanium and compare these values with those given in Table 18.3.*

Figure 18.16

