

1. Prove the relative permeability μ_r is given by
$$\mu_r = 1 + \chi$$
 (susceptibility) in SI, and $\mu_r = 1 + 4\pi\chi$ in cgs, respectively.
2. Calculate the magnetic induction B(in Tesla) and magnetization M(in Oe) of a paramagnetic material with the relative permeability $\mu_r = 1.001$ under an applied field strength H of 5.0×10^5 A/m.
3. An electromagnet is a helical winding of wire through which an electric current flows. Such a “solenoid” of 1000 turns is 10 cm long and is passed through by a current of 2A. What is the field strength in Oe and A/m?
4. Draw and explain $\chi(T)$ for normal diamagnets, normal paramagnets and antiferromagnets. Also, draw and explain M(T) curves for normal ferromagnets and ferrimagnets below T_c .
5. Calculate the diamagnetic susceptibility of germanium. Take $\bar{r} = 0.92 \text{ \AA}$. Check your units. Does χ come out unitless? Compare your result with that listed in Table 14.1.