3. 17 (a) We are asked to calculate the unit cell volume for Be. For HCP, from the solution to Problem 3.6

$$V_C = 6R^2c\sqrt{3}$$

But, $c = 1.568a$, and $a = 2R$, or $c = 3.14R$, and

$$V_C = (6)(3.14)\, R^3\sqrt{3}$$

$$= (6)(3.14)\left(\sqrt{3}\right)\left[0.1143 \times 10^{-7}\ \text{cm}\right]^3 = 4.87 \times 10^{-23}\ \text{cm}^3/\text{unit cell}$$

(b) The theoretical density of Be is determined, using Equation 3.5, as follows:

$$\rho = \frac{nA_{\text{Be}}}{V_C N_{\text{A}}}$$

For HCP, $n = 6$ atoms/unit cell, and for Be, $A_{\text{Be}} = 9.01$ g/mol (as noted inside the front cover). Thus,

$$\rho = \frac{(6\ \text{atoms/unit cell})(9.01\ \text{g/mol})}{\left(4.87 \times 10^{-23}\ \text{cm}^3/\text{unit cell}\right)\left(6.023 \times 10^{23}\ \text{atoms/mol}\right)}$$

$$= 1.84\ \text{g/cm}^3$$

The value given in the literature is 1.85 g/cm^3.