Chapter 1 Problem 30 [†]

Given
$V_{earth} = 10^{21}\ m^3$

Solution
Convert the volume of the earth into different units.

a) Convert the volume into km^3.
Since volume is distance cubed, the conversion factor must be cubed.

$$10^{21}\ m^3 \left(\frac{1\ km}{1000\ m}\right)^3 = 10^{12}\ km^3$$

b) Convert the volume into mi^3.
Since volume is distance cubed, the conversion factor must be cubed. To convert to miles we know that $1\ mi = 1.6\ km$.

$$10^{21}\ m^3 \left(\frac{1\ km}{1000\ m}\right)^3 \left(\frac{1\ mi}{1.6\ km}\right)^3 = 2.4 \times 10^{11}\ mi^3$$

c) Convert the volume into cm^3.
Since volume is distance cubed, the conversion factor must be cubed.

$$10^{21}\ m^3 \left(\frac{100\ cm}{1\ m}\right)^3 = 10^{27}\ cm^3$$

[†]Problem from University Physics by Ling, Sanny and Moebs (OpenStax)