Non Sibi High School

Andover's Chem 550/580: Advanced Chemistry

Chapter 2, Review Quiz 1 Answers

1

Convert the following:

a. 0.040 milligrams neon to number of neon atoms

b. 7.43×10^{25} magnesium atoms to kilograms magnesium

a.

$$0.040\,\text{mg Ne}\left(\frac{1\,\text{g}}{1000\,\text{mg}}\right)\left(\frac{1\,\text{mol}}{20.18\,\text{g}}\right)\left(\frac{6.02\times10^{23}\,\text{atoms}}{1\,\text{mol}}\right) = 1.2\times10^{18}\,\text{atoms Ne}$$

b.

$$7.43\times10^{25}\,\text{atoms Mg}\left(\frac{1\,\text{mol}}{6.02\times10^{23}\,\text{atoms}}\right)\left(\frac{24.31\,\text{g}}{1\,\text{mol}}\right)\left(\frac{1\,\text{kg}}{1000\,\text{g}}\right) = 3.00\,\text{kg Mg}$$

2

The density of liquid $C_2H_4(NH_2)_2$ is 0.90 g/mL. What is the volume in liters of 1.08×10^{26} molecules of $C_2H_4(NH_2)_2$?

$$1.08\times10^{26}\,\text{molecules}\left(\frac{1\,\text{mol}}{6.02\times10^{23}\,\text{molecules}}\right)\left(\frac{60.10\,\text{g}}{1\,\text{mol}}\right)\left(\frac{1\,\text{mL}}{0.90\,\text{g}}\right)\left(\frac{1\,\text{L}}{1000\,\text{mL}}\right) = 12\,\text{L}$$

3

The density of solid $C_{12}H_{22}O_{11}$ is 1.59 g/cm^3. How many molecules are in 0.075 m^3 of $C_{12}H_{22}O_{11}$? How many carbon atoms are in this sample?

$$0.075\,\mathrm{m}^3\left(\frac{100^3\,\mathrm{cm}^3}{1\,\mathrm{m}^3}\right)\left(\frac{1.59\,\mathrm{g}}{1\,\mathrm{cm}^3}\right)\left(\frac{1\,\mathrm{mol}}{342.3\,\mathrm{g}}\right)\left(\frac{6.02\times10^{23}\,\mathrm{molecules}}{1\,\mathrm{mol}}\right)=2.1\times10^{26}\,\mathrm{molecules}$$

$$2.1\times10^{26}\,\mathrm{molecules}\left(\frac{12\,\mathrm{C\,atoms}}{1\,\mathrm{molecule}}\right)=2.5\times10^{27}\,\mathrm{C\,atoms}$$

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