



Name: \_\_\_\_\_  
Blk: \_\_\_\_\_ Date: \_\_\_\_\_

## Chemistry 11 DENSITY

Solid

31. A 3.50 mL chunk of boron has a mass of 8.19 g. What is the density of the boron?
32. An iron bar has a mass of 125 g. If iron's density is  $7.86 \times 10^3$  g/L, what volume does the bar occupy?
33. A block of beeswax has a volume of 200.0 mL and a density of 961 g/L. What is the mass of the block?
34. Alcohol has a density of 789 g/L. What volume of alcohol is required in order to have 46 g of alcohol?
35. A gas called neon is contained in a glass bulb having a volume of 22.4 L. If the density of the neon is 0.900 g/L, what is the mass of the neon in the bulb?
36. A 70.0 g sphere of manganese (density =  $7.20 \times 10^3$  g/L) is dropped into a graduated cylinder containing 54.0 mL of water. What will be the water level indicated after the sphere is inserted?
37. A 25.0 mL portion of each of W, X, Y and Z is poured into a 100 mL graduated cylinder. Each of the 4 compounds is a liquid and will not dissolve in the others. If 55.0 mL of W have a mass of 107.3 g, 12.0 mL of X have a mass of 51.8 g, 42.5 mL of Y have a mass of 46.8 g and 115.0 mL of Z have a mass of 74.8 g, list the layers in the cylinder from top to bottom.
38. Explain why boats made of iron are able to float. The density of iron is  $7.86 \times 10^3$  g/L.
39. If the density of copper is  $8.92 \times 10^3$  g/L and the density of magnesium is  $1.74 \times 10^3$  g/L, what mass of magnesium occupies the same volume as 100.0 g of copper?
40. The sun has a volume of  $1.41 \times 10^{30}$  L, an average density of 1.407 g/mL, and can be thought of as more or less pure hydrogen. If the sun consumes  $4.0 \times 10^6$  t of hydrogen per second, how many years will it take at this rate to burn all of the hydrogen? Hint: use the results of exercise 17(k). The sun will actually cease burning its hydrogen in far less time than indicated by this simple calculation.
41. (OPTIONAL: A Stinker!) A hollow cylinder, closed at both ends, has a volume of 250.0 mL and contains 4.60 g of argon gas. A 90.0 g cube of sodium (density = 970.0 g/L) is inserted into the tube in such a way that no gas escapes. What is the density of the gas afterwards?

### \* Density Ex 31-39 KEY \*

$$31. D = \frac{M}{V} \rightarrow \frac{8.19 \text{ g}}{3.50 \text{ mL}} \left( \frac{1 \text{ mL}}{1 \text{ cm}^3} \right) = \boxed{2.34 \text{ g/cm}^3}$$

$$32. V = \frac{M}{D} \rightarrow 125 \text{ g} \cdot \left( \frac{1 \text{ L}}{7.86 \cdot 10^3 \text{ g}} \right) \left( \frac{1 \text{ mL}}{1 \cdot 10^{-3} \text{ L}} \right) \left( \frac{1 \text{ cm}^3}{1 \text{ mL}} \right) = \boxed{15.9 \text{ cm}^3}$$

$$33. M = [V \cdot D] \rightarrow 200.0 \text{ mL} \left( \frac{1 \cdot 10^{-3} \text{ L}}{1 \text{ mL}} \right) \left( \frac{961 \text{ g}}{1 \text{ L}} \right)$$



$$= \boxed{192 \text{ g}}$$

$$34. \textcircled{V} = m \div \textcircled{D} \rightarrow 46 \text{ g} \cdot \left( \frac{1 \text{ L}}{789 \text{ g}} \right) \left( \frac{1 \text{ mL}}{1.10^{-3} \text{ L}} \right)$$

$$= \boxed{58 \text{ mL}}$$

$$35. m = V \cdot D \rightarrow 22.4 \text{ L} \cdot \left( \frac{0.900 \text{ g}}{1 \text{ L}} \right) = \boxed{20.2 \text{ g Ne}}$$

$$36. V = m \div D \rightarrow 70.0 \text{ g} \cdot \left( \frac{1 \text{ L}}{7.20 \cdot 10^3 \text{ g}} \right) \left( \frac{1 \text{ mL}}{1.10^{-3} \text{ L}} \right) = 9.72 \text{ mL Sphere}$$

$$\begin{array}{r} \text{water level} = 54.0 \text{ mL} \\ + \quad 9.72 \text{ mL} \\ \hline 63.72 \text{ mL} \end{array}$$

$$\therefore \boxed{\text{water @ } 63.7 \text{ mL}}$$

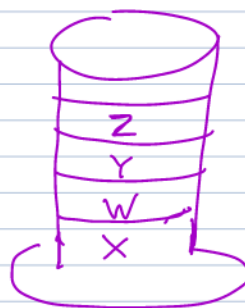
37.

$$\underline{W}_D = \frac{107.3 \text{ g}}{55.0 \text{ mL}} = 1.95 \text{ g/mL}$$

$$\underline{X}_D = \frac{51.8 \text{ g}}{12.0 \text{ mL}} = 4.32 \text{ g/mL}$$

$$Y_D = \frac{46.8 \text{ g}}{42.5 \text{ mL}} = 1.10 \text{ g/mL}$$

$$Z_D = \frac{74.8 \text{ g}}{115.0 \text{ mL}} = 0.650 \text{ g/mL}$$



38. Iron boat is filled with air  
(not solid iron)  $\therefore$  will float in water

$$\textcircled{39.} \quad C_{\text{Cu}} = \frac{8.92 \cdot 10^3 \text{ g}}{1 \text{ L}} \quad M_{\text{Mg}} = \frac{1.74 \cdot 10^3 \text{ g}}{1 \text{ L}}$$

$$100.0 \text{ g Cu} \cdot \left( \frac{1 \text{ L}}{8.92 \cdot 10^3 \text{ g Cu}} \right) \left( \frac{1.74 \cdot 10^3 \text{ g Mg}}{1 \text{ L}} \right) = \boxed{19.5 \text{ g Mg}}$$

