Chapter 16 HW Answers

Review Questions:

5. Solution: all parts in the same phase
Suspension: different parts in different phases

8. All parts of the ruby are in the same phase, so it is a solution.

15. The increase in temperature allows the gas to escape the solution more easily.

Exercises:

1. Milk = homogeneous mixture
Steel = compound
Ocean water = homogeneous mixture
Blood = homogeneous mixture
Sodium = element
Planet Earth = heterogeneous mixture

13. Both distilled water and tap water contain **air**.

28. Air is separating from the mixture of water before the water boils.

Problems:

4. What is the amount of sodium chloride?

Concentration = 3.0 g/L
Volume = 15 L

The equation we need to use is:

$$\text{Concentration} = \frac{\text{amount solute (grams)}}{\text{volume solution (Liters)}}$$

$$C = \frac{s}{L}$$

$$s = CL = (3.0 \frac{\text{grams}}{\text{Liter}})(15\ \text{L}) = \mathbf{45\ grams}$$

5. Moles = 1 mole
Volume = 1 L

The equation we need to use is:

$$\text{Molarity} = \frac{\text{Moles}}{\text{Liter}} = \frac{1\ \text{mole}}{1\ \text{L}} = \mathbf{1\ M}$$

Additional:

1. Compound, mixture, or element?

a. Copper — Element
b. Salt — Compound
c. Aspirin — Compound
d. Ice — Compound and Mixture
e. Plastic — Compound
f. Aluminum — Element
g. H_2O — Compound

2. There are 1×10^{24} molecules present.
0.0001 percent of these molecules are impure.

0.0001 percent = 0.000001

0.000001(1×10^{24} molecules) = **1×10^{18} molecules are impure**

Ratio: $\frac{1 \times 10^{18} \text{ impure}}{1 \times 10^{24} \text{ total}} = \frac{\mathbf{1}}{\mathbf{1{,}000{,}000}}$ **(Only 1 in 1 million are impure!)**

3. Concentration = $\frac{\text{Amount solute (grams)}}{\text{Volume solution (Liters)}}$

a. $\frac{10 \text{ grams}}{355 \text{ mL}} = \frac{10 \text{ grams}}{0.355 \text{ L}} =$ **28 g/L**

b. $\frac{2 \text{ grams}}{200 \text{ mL}} = \frac{2 \text{ grams}}{0.2 \text{ L}} =$ **10 g/L**

c. $\frac{0.25 \text{ kg}}{1/2 \text{ L}} = \frac{250 \text{ grams}}{0.5 \text{ L}} =$ **500 g/L**

4. Molarity = $\frac{\text{Moles}}{\text{Liter}}$

a. $\frac{200 \text{ moles}}{2 \text{ L}} =$ **100 M**

b. $\frac{2 \text{ moles}}{200 \text{ mL}} = \frac{2 \text{ moles}}{0.2 \text{ L}} =$ **10 M**

Extra Credit:

Step 1: The vinegar chemically reacts with the egg shell and produces a gas.

Step 2: The membrane of the egg remains intact and unaffected by the chemical reaction.

Step 3: The egg in water should have grown larger.
The egg in molasses should have shrunk smaller.

Step 4: The egg in the water experienced **osmosis**.
The egg in the molasses experienced **reverse osmosis**.