Chemistry Name: _____

Section _____ Sci Method Density WS Date: _____

Scientific Method

Number the following steps of the scientific method in the proper order.

2 Research the problem.

5 Observe and record.

3 Make a hypothesis.

1 Identify the problem.

6 Arrive at a conclusion.

7 Report the experiment for peer review.

4 Test the hypothesis.

Match the following terms with the correct definition.

b	hypothesis	a)	organized process used to test a hypothesis
g	control	b)	an educated guess about the solution to a problem
f	variable	c)	observations and measurements recorded during an experiment
a	experiment	d)	a judgement based on the results of an experiment
d	conclusion	e)	a logical explanation for events that occur in nature
e	theory	f)	factor that changes in an experiment
c	data	g)	used to show that the result of an experiment is really due to the condition being tested

Density

Solve the following problems. Show set-up, substitutions, and units.

1. What is the density of carbon dioxide gas if 0.196 g occupies a volume of 100 mL?

   d = ?
   m = 0.196 g
   V = 100 mL

   $$d = \frac{m}{V} = \frac{0.196\ g}{100\ mL} = 0.00196\ g/mL = 1.96 \times 10^{-3}\ g/mL$$

2. A cubic block of wood 3.0 cm on a side has a mass of 27g. What is the density of the block?

   l = 3.0 cm
   m = 27 g
   V = l^3

   $$V = l^3 = (3.0\ cm)^3 = 27\ cm^3$$
   $$d = \frac{m}{V} = \frac{27\ g}{27\ cm^3} = 1.0\ g/cm^3$$

3. A stone was lowered into a graduated cylinder holding 22.0 mL of water. The height of the water rose to 27.0 mL. If the mass of the stone was 25g, what was its density?

   d = ?
   m = 25 g
   V = 27.0 mL – 22.0 mL

   $$d = \frac{m}{V} = \frac{25\ g}{5.0\ mL} = 5.0\ g/mL$$

4. Silver has a density of 10.5 g/cm^3, and gold has a density of 19.3 g/ cm^3. Which would have a greater mass, 7.0 cm^3 of silver or 4.2 cm^3 of gold?

   d = 10.5 g/cm^3
   m = ?
   V = 7.0 cm^3

   $$m = dV = \frac{10.5\ g}{cm^3} \times 7.0\ cm^3 = 73.5\ g_{Ag}$$

   d = 19.3 g/cm^3
   m = ?
   V = 4.2 cm^3

   $$m = dV = \frac{19.3\ g}{cm^3} \times 4.2\ cm^3 = \boxed{81.1\ g_{Au}}$$

5. 5.0 milliliters of ethanol has a mass of 3.9 grams and 5.0 milliliters of benzene has a mass of 4.4 grams. Which liquid has the higher density?

   d = ?
   m = 3.9 g
   V = 5.0 mL

   $$d = \frac{m}{V} = \frac{3.9\ g}{5.0\ mL} = 0.78\ g/mL_{EtOH}$$

   d = ?
   m = 4.4 g
   V = 5.0 mL

   $$d = \frac{m}{V} = \frac{4.4\ g}{5.0\ mL} = \boxed{0.88\ g/mL_{benzene}}$$