ANSWERS to DENSITY PROBLEMS completed on Nov 26, 2020
SCIENCE 8 Toombs

Name: _____
Date: _____
Period: _____

EXERCISES: DENSITY

Part 1: Answer the following questions. Include a) equation b) substitution c) solution with units.

1- If a piece of wood occupies 75 cm^3 and has a mass of 50 g, what is its density? Will it float on water? $\rho = \frac{m}{V} = \frac{50g}{75cm^3} = 0.67 g/cm^3$ Since: $0.67 < 1.00$ ← water density
↑ wood density
the wood floats.

2- A plastic bag filled with gas has a mass of 125 g and a volume of 100 litres. What is its density? Will it float in air? $\rho = \frac{m}{V} = \frac{125g}{100L} = 0.8 g/L$ It will float in air because $0.8 g/L < 1.2 g/L$

3- Zinc metal has a density of 7.14 g/cm^3 under normal conditions. If we have 65 cm^3 of zinc, what mass of the metal is present?
$m = V\rho = 65cm^3 \times \frac{7.14g}{cm^3} = 464.1g$

4- Gold metal at room conditions has a density of 19.3 g/ cm^3. What mass is contained in 65 cm^3 of gold? $m = V \times \rho = 65cm^3 \times \frac{19.3g}{cm^3} = 1254.5g$

5- Lead has a density of 11.4 g/ cm^3. What volume is occupied by 100 g of lead?
$V = \frac{m}{\rho} = \frac{100g}{11.4g/cm^3} = 8.77mL$

6- Chlorine has a density of 3.17 g/L. What space is occupied by 100 g of chlorine?
$V = \frac{m}{\rho} = \frac{100g}{3.17g/L} = 31.55L$

7- Ice floats in water. What does this tell us about the density of ice?
~~The ice particles are very light~~ NEVER say this!
Always say Ice is less dense than H_2O

8- Helium balloons float in air. What does this tell us about the density of these balloons?
If Helium balloons float in air, then we know that the density of He is less than 1.2g/L

9- Mercury has a density of 13.6 g/mL and lead has a density of 11.4 g/ cm^3. Will lead float or sink in liquid mercury? Lead will float in Mercury because the Density of lead < Density of mercury.

Part 2: Density calculations

60 g; 20 mL: D = 3g/mL

b) 2 kg; 2000 mL: D = 1g/mL

c) 100 g; 75 mL: D = $1.\overline{3}$ g/ mL

d) 51 g; 30 mL: D = 1.7g/mL

Name: Key.
Date:
Period:

Answer key

Assignment:

~~Answer~~ these questions on a separate page in the correct scientific manner including:

a) Equation b) Substitution of values and c) Solution with units.

1. A block has a mass of 100 grams and measures l = 10 cm, w = 10 cm, h = 2 cm. Find its volume and density.
   $V = (10)(10)(2)\,cm^3$ $m = 100g$ $D = \frac{m}{V}$ $D = \frac{100}{200}$ $\boxed{D = 0.5\,g/mL}$
   $V = 200mL$ $D = ?$

2. A steel cube (iron) has a mass of 78.6 grams and a volume of 10 cm^3.
   a) Calculate the density of the iron cube.
   $D = \frac{m}{V}$ $m = 78.6g$ $V = 10cm^3$ $D = \frac{78.6}{10}$ $\boxed{D = 7.86\,g/cm^3}$
   b) What is the density of iron as given in your Table of Properties?
   $D = 7.86\,g/cm^3$.

3. A cube has a mass of 89.5 grams and a volume of 10 cm^3.
   a) Calculate the density of the cube.
   $m = 89.5g$ $V = 10cm^3$ $D = \frac{m}{V}$ $D = \frac{89.5g}{10cm^3}$ $\boxed{D = 8.95g/cm^3}$
   b) Look in the Table of Properties to determine if the cube is aluminum, carbon, copper or gold
   Copper.

4. Describe in your own words how to determine the density of a regularly shaped block. (1.b b)
   ① measure length, width & height ③ measure mass
   ② $V = L \times W \times h$ ④ Calc $D = \frac{m}{V}$

6 A stone has a mass of 150 g and causes the water level in a graduated cylinder to rise from 50 mL to 75 mL when placed in it.
   a) Calculate the density of the stone. $m = 150g$ $V = 25mL$ $D = \frac{150g}{25mL} = 6g/mL$
   b) Will this stone float or sink in water? Give a reason.
   Sink, $D_{water} = 1g/mL$, stone more dense.

7 A stone displaces 10 mL of water.
   a) What is the volume of the stone (use correct units)? $V = 10mL$
   b) If the stone has a density of 6 g/cm3, what is the mass of the stone?
   $D = 6g/cm^3$ $m = ?$ ~~$D = \frac{m}{V}$~~ ~~$6 = \frac{m}{10}$~~
   $V = 10mL$ $m = V \times \rho = 6 \times 10$ $\boxed{m = 60g}$

8 A piece of volcanic pumice causes the water level in a cylinder to rise from 50 to 60 mL. If the pumice has a mass of 9 grams, what is the density of the pumice?
   $V = 10mL$ $D = \frac{m}{V}$ $D = \frac{9}{10} \Rightarrow \boxed{D = 0.9\,g/mL}$
   $m = 9g$
   $D = ?$