

Unit 6 Exercise 4 –Applied Density Problems

1. Ethanol has a density of 0.789 g/cm^3 . What is the mass of 225 cm^3 of ethanol?
2. What is the density of water in g/mL ? Write a sentence that describes the meaning of this density.
3. The cup is a volume widely used by cooks in the U.S. One cup is equivalent to 225 cm^3 . If 1 cup of olive oil has a mass of 205 g, what is the density of olive oil in g/cm^3 ?
4. What would you expect to happen if the cup of olive oil in question 3 is poured into a container of water? Why?
5. A solution that is clear, tasteless, and odorless has a density of 0.855 g/cm^3 . What is the mass (in kg) of a 500 mL sample of this solution?
6. What would you expect to have happen if this solution (from question 5) were placed in the olive oil and water container from question 4? Why?
7. A student has two $3 \text{ cm} \times 3 \text{ cm} \times 5 \text{ cm}$ samples of wood. The block of white pine has a mass of 18 grams and the block of white oak has a mass of 40.5 grams. What will happen when they are placed in the large container from question 6? Be specific and justify your answer.

8. Pyrite (fool's gold) can look very much like gold. Assume that you have a piece of a solid that looks as though it may be gold, but you believe it to be pyrite. The sample has a mass of 23.5 g. When placed in a graduated cylinder, the water level rises from 47.5 mL to 52.2 mL. Is the sample pyrite (density = 5.00 g/ cm³) or real gold (density = 19.4 g/ cm³)?

Gold has a density of 19.4 g/ cm³. A cube of gold measures 4.23 cm on each edge:

9. What is the volume of the cube?

10. What is its mass?

11. A standard backpack is approximately 30cm x 30cm x 40cm. Suppose you find a hoard of pure gold while treasure hunting in the wilderness. How much mass would your backpack hold if you filled it with the gold? An average student has a mass of 70 kg. How do these values compare?

Challenge Question.

12. The area of a platinum sheet is 6.25 cm^2 and has mass of 1.656 g. If its density is 21.45 g/cm³, then what is the thickness in mm?