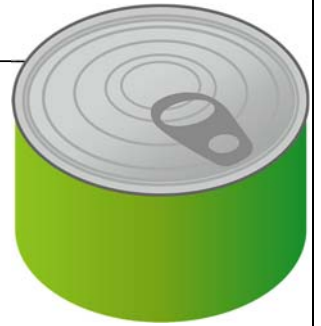Name _____

Alloy Adventures and Mixture Mysteries

When substances combine (like metals in an alloy or liquids in a mixture), the overall density depends on the **total mass** and **total volume** of all components.

Use: $D_{\text{mixture}} = \dfrac{m_{\text{total}}}{V_{\text{total}}}$

or for proportional mixing: $D_{\text{avg}} = \dfrac{(D_1 \times V_1) + (D_2 \times V_2)}{V_1 + V_2}$

Key Idea: Density is not a simple average-it's a **weighted average** based on the amount of each material.

1. An alloy is made by combining **300 g of metal A (density 8.0 g/cm³)** and **200 g of metal B (density 5.0 g/cm³)**.

What is the density of the alloy? _____

2. A mixture contains **50 mL of oil (0.9 g/mL)** and **100 mL of water (1.0 g/mL)**.

Find the overall density of the mixture. _____

3. A jeweler melts **20 g of gold (19.3 g/cm³)** and **5 g of copper (8.9 g/cm³)** together.

What is the density of the resulting alloy? _____

4. A scientist mixes **100 cm³ of aluminum (2.7 g/cm³)** and **100 cm³ of iron (7.9 g/cm³)**.

What is the combined density of the mixture? _____

5. A block is made of two materials: Top half: 60 cm³, density = 2.0 g/cm³

Bottom half: 40 cm³, density = 6.0 g/cm³

Find the block's average density. _____

6. If **equal masses** of lead (11.3 g/cm³) and silver (10.5 g/cm³) are melted together, will the alloy's density be closer to 11.3 or 10.5?

 Explain. _____

7. A scientist combines **10 mL of ethanol (0.79 g/mL)** and **10 mL of water (1.00 g/mL)**. The total volume measured is **less than 20 mL** due to molecular mixing.

How will this affect the final density? _____