

Directions: Answer all questions on a separate sheet of paper. Show all work for calculations and circle your final answer (written in scientific notation). SHOW UNITS, e.g. m, g, cm³, L, etc. The key to success in chemistry is learning how to keep track of units and treating them algebraically. For example, $cm \times cm = cm^2$, and $cm \div cm = 1$.

1. The mass of an empty fish tank is 10.0kg, and it measures $1.00m \times 0.50m \times 0.30m$. What is the mass of the fish tank after you fill it with water?
2. Oxygen and Hydrogen react to make water: $2H_2 + O_2 \rightarrow 2H_2O$
If 70.44g of oxygen reacts with Hydrogen and produces 79.24g of water, then how many grams of Oxygen and Hydrogen are in 150ml of water?
3. If 1.000L of methanol (CH₄O) is added to 1.000L of water, each measured separately, the final volume is 1945ml at 20°C. The density of methanol is $7.92 \times 10^{-1} g/cm^3$. What is the density of the new mixture in kg/m^3 ?
4. The density of copper is $8.96g/cm^3$. What is the mass of a copper cylinder with a diameter of 2.50cm and a length of 8.80cm?
5. 70/30 brass is a mixture of copper and zinc, so in a 100.0g sample 70.0g is copper and 30.0g is zinc. Approximately 2.35dL of 70/30 brass is needed to cast a trumpet. If the density of 70/30 brass is $8.530g/cm^3$, then what is the mass of zinc in the instrument?
6. How many zinc atoms are in 257.3 grams of zinc?
7. What is the mass (in kilograms) of a block of iron if it is made of 7.55×10^{28} iron atoms?
8. The density of helium gas is 0.179g/L at standard temperature and pressure. How many He atoms are in one cubic meter of helium gas?
9. 2.5×10^{25} copper atoms are stretched into the shape of a wire. How long is the wire if its diameter is 0.64mm?
10. If you counted by 1 every second, then how many years would it take to count to a mole?
(Avogadro's number = 6.02×10^{23} of anything)