

Chemistry 145 – Van Bramer
Fall 2016 Problem Set – Week 1

1. An atom is approximately 1 angstrom (\AA) in diameter, express this in inches (in) and in micrometers (μm).
2. The temperature of Liquid Helium is 4 K, express this in degrees Celsius and degrees Fahrenheit.
3. A nice size diamond is $3/4$ carats. Express this in grams.
4. What is 1 metric ton in grams, kg, and pounds?
5. A typical garbage dumpster is 8 cubic yards. Express this in liters.
6. The volume of the milk for school lunch is $1/2$ pint. How many liters and milliliters is this?
7. The distance to the moon is 238,855 miles. How many meters is this?
8. The speed of light is $3 \times 10^8 \text{ m s}^{-1}$. How many miles per hour is this? How many meters/sec.
9. Speed of sound, 740 mph. If you see a flash of lightening and then hear thunder 6 seconds later, how far away is the storm?
10. The length of a C-C bond in diamond is 1.54452 \AA . Convert this to cm, m, and inches (watch significant figures on this one)
11. The mass of the sun is $1.989 \times 10^{30} \text{ kg}$ and the radius is 696000 km. What is the average density of the sun?
12. In the opening scenes of the movie Raiders of the Lost Ark, Indiana Jones tries to remove a gold idol from a booby-trapped pedestal. He replaces the idol with a bag of sand of approximately equal volume. (Density of gold = 19.32 g/cm^3 ; density of sand 3 g/cm^3 .) {from Zumdahl, Chemistry, Saunders (1994).}. Why did the giant rock try to roll over everyone?
13. The current men's world record for the hundred meter dash is 9.58 s by Usain Bolt from Jamaica. What was his average speed in miles per hour?
14. The mercury concentration in a polluted lake is $0.0125 \mu\text{g Hg/L}$, what is the total mass in kilograms of mercury in the lake if the lake is approximately circular with a diameter of 10 miles and an average depth of 50 ft?