

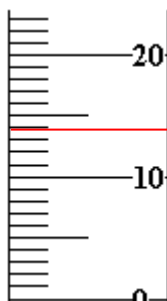
AP Chem Foundations Topic #1 WS Packet

Foundations WS#1: Measurements

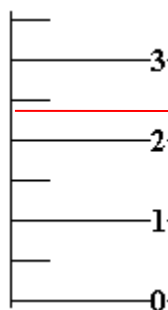
For problems where calculations are necessary, you **must show work** on another sheet of paper.

1. For each of the following pieces of glassware, record a measurement for the red line and discuss the number of significant figures and uncertainty.

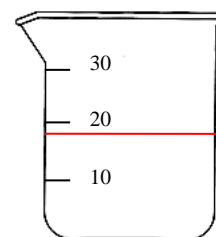
a.



b.



c.



2. Distinguish between physical and chemical changes.
3. Which of the following are exact numbers?
- The elevation of Breckenridge, CO, is 9600ft.
 - There are 12 eggs in a dozen.
 - One yard is equal to 0.9144m.
 - The announced attendance at a football game was 52,806.
 - In 1983, 1759 Ph.D.s in chemistry were awarded in the U.S.
 - The budget deficit of the U.S. government in fiscal year 1990 was \$269 billion.
4. How many significant figures are in each of the following?
- 0.00001010
 - 1098
 - 1.01×10^{-5}
 - 2001
 - 1000.
 - 25,000
5. Round off each of the following numbers to three significant figures, and write the answer in standard exponential notation.
- 312.54
 - 0.0031254
 - 31,254,000
 - 0.31254
 - 31.254×10^{-3}
6. Perform the following mathematical operations and express each result to the correct number of significant figures.
- $97.31 + 4.2502 + 0.99195$
 - $171.5 + 72.915 - 8.23$
 - $1.00914 + 0.87104 + 1.2012$
 - $21.901 - 13.21 - 4.0215$
7. Perform the following mathematical operations and express each result to the correct number of significant figures.
- $0.1654 + 2.07 - 2.114$
 - $[(8.925 - 8.904) / 8.925] \times 100.00$
 - $(9.04 - 8.23 + 21.954 + 81.0) \div 3.1416$
 - $(9.2 \times 100.65) / (8.321 + 4.026)$

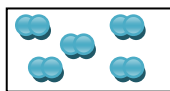
Foundations WS#2: Dimensional Analysis

1. Perform each of the following conversions.
- $2.41 \times 10^2 \text{ cm}$ to m
 - 294.5nm to cm
 - 903.3nm to μm
2. Precious metals and gems are measured in troy weights in the English system:
- 24 grains = 1 pennyweight (exact)
20 pennyweights = 1 troy ounce (exact)
12 troy ounces = 1 troy pound (exact)
1 grain = 0.0648 gram
1 carat = 0.200 gram
- The most common English unit of mass is the pound avoirdupois. What is one troy pound in kilograms and pounds?
 - What is the mass of a troy ounce of gold in grams and carats?
 - The density of gold is 19.3 g/cm^3 . What is the volume of a troy pound of gold?
3. A person has a temperature of 102.5°F . What is this temperature on the Celsius scale and Kelvin scale?

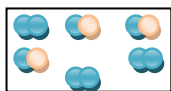
- Convert the following Celsius temperatures to Kelvin and to Fahrenheit degrees.
 - a cold wintery day, -25°C
 - the m.p. temperature of sodium chloride, 801°C
- A star is estimated to have a mass of $2 \times 10^{36}\text{kg}$. Assuming it to be a sphere of average radius $7.0 \times 10^5\text{km}$, calculate the average density of the star in units of grams per cubic centimeter.
- Diamonds are measured in carats, and $1 \text{ carat} = 0.200\text{g}$. The density of a diamond is 3.51g/cm^3 . What is the volume of a 5.0-carat diamond?
- A sample containing 33.42g of metal pellets is poured into a graduated cylinder initially containing 12.7mL of water, causing the water level in the cylinder to rise to 21.6mL . Calculate the density of the metal.

Foundations WS#3: Density

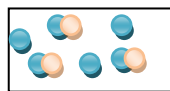
- In each of the following pairs, which has the greater mass? Show work if needed to calculate mass.
 $d_{\text{Pb}} = 11.34\text{g/cm}^3$ $d_{\text{H}_2\text{O}} = 1.0\text{g/cm}^3$ $d_{\text{Au}} = 19.32\text{g/cm}^3$ $d_{\text{Hg}} = 13.6\text{g/cm}^3$ $d_{\text{benzene}} = 0.880\text{g/cm}^3$ $d_{\text{Cu}} = 8.96\text{g/cm}^3$
 - 1.0kg of feathers or 1.0kg of lead
 - 1.0mL of mercury or 1.0mL of water
 - 19.3mL of water or 1.00mL of gold
 - 75mL of copper or 1.0L of benzene
- The density of osmium (the densest metal) is 22.57g/cm^3 . If a 1.00kg rectangular block of osmium has 2 dimensions of $4.00\text{cm} \times 4.00\text{cm}$, calculate the third dimension of the block.
- What are some of the differences between a solid, a liquid, and a gas?
- Match each description below with the following microscopic pictures. More than one picture may fit each description. A picture maybe used more than once or not used at all.



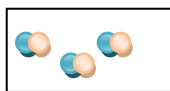
i



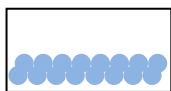
ii



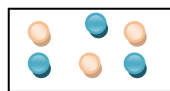
iii



iv



v



vi

- a gaseous compound
 - a mixture of two gaseous elements
 - a solid element
 - a mixture of a gaseous element and a gaseous compound.
- Classify the following as physical (P) or chemical (C) changes.
 - Moth balls gradually vaporize in a closet.
 - Hydrofluoric acid attacks glass, and is used to etch calibration marks on glass laboratory utensils.
 - A French chef making a sauce with brandy is able to burn off the alcohol from brandy, leaving just the brandy flavoring.
 - Chemistry majors sometimes get holes in the cotton jeans they wear to lab because of acid spills.

Answer Key Foundations

WS#1

1-5 In-class

- 102.55
 - 236.2
 - 3.081
 - 4.67
- 467
 - 0.24
 - 33.04
 - 75

WS#2

- 84.3 mm
 - 2.41m
 - $2.945 \times 10^{-5}\text{cm}$
 - 14.45km
 - $2.353 \times 10^5\text{mm}$
 - $0.9033\mu\text{m}$
- 0.373kg , 0.822lb
 - 31.1g , 156 carats
 - 19.3 cm^3
- 39.2°C , 312.4K
- 248K , -13°F
 - 1074K , 1470°F
- $1 \times 10^6\text{cm}^3$
- 0.28cm^3
- 3.8g/cm^3

WS#3

- both same
 - 1.0 mL Hg
 - both same
 - $1.0\text{L benzene (C}_6\text{H}_6)$
- 2.77cm
- In-class