

Name (PRINT) KEY

1. True or False. [6 pts]

- a) The reaction of hydrogen gas with oxygen gas to produce water is an example of a physical change.

FALSE. This is a chemical change.

- b) Sulfur, S₈, would be classified as an element.

TRUE.

- c) $1000 \text{ cm}^3 = 1 \text{ L}$

TRUE.

- d) A small amount of table salt, NaCl, completely dissolved in water would be classified as a homogeneous mixture.

TRUE.

- e) Accuracy is a measure of how closely two or more measurements of the same quantity agree with one another.

FALSE. This statement is the definition of precision, not accuracy.

- f) Isotopes of a given element have the same number of protons.

TRUE.

2. What is the number of **significant figures** in each of the following measured quantities? [4 pts]

a) 10005 g/cm^3 5

b) 0.00200 cm 3

c) 250 min 2 or 3

d) $4.000 \times 10^{19} \text{ pg}$ 4

3. Carry out the following operations and express the **answer** with the appropriate number of **significant figures**. [3 pts]

a) $97.5 + 11.012 =$ 108.5

b) $(4.2 \times 10^2) \times 768.15 =$ 3.2×10^5

c) $(5.20 + 6.8) \times 8.234 =$ 98.8

4. Complete the following table of metric prefixes. [4 pts]

Prefix	Symbol	Meaning (Number)
pico-	p	1×10^{-12}
milli-	m	1×10^{-3}
kilo-	k	1×10^3
centi-	c	1×10^{-2}

5. Fill in the blank with the scientist's name. [3 pts]

- Thomson** determined that electrons existed in all elements.
- Rutherford** proved that most of the atom was empty space.
- Millikan** determined the mass of an electron.

6. For each of the following species, determine the number of protons, neutrons, and electrons in the atom. [6 pts]

	protons	neutrons	electrons
a) ${}^3_2\text{He}$	2	1	2
b) ${}^{25}\text{Mg}^{2+}$	12	13	10
c) ${}^{48}_{22}\text{Ti}$	22	26	22
d) ${}^{209}\text{Bi}^{3-}$	83	126	86

7. The radius of an oxygen atom is 73 picometers (pm). Convert this radius to units of **inches**. (1 in = 2.54 cm). [4 pts]

$$73 \text{ pm} \times \frac{1 \times 10^{-12} \text{ m}}{1 \text{ pm}} \times \frac{1 \text{ cm}}{1 \times 10^{-2} \text{ m}} \times \frac{1 \text{ in}}{2.54 \text{ cm}} = \mathbf{2.9 \times 10^{-9} \text{ in}}$$

8. The average US automobile releases **0.38 kg** of CO_2 **per mile** that the car is driven. Assuming that the average person drives 33 miles per day, what is the amount CO_2 released in **pounds** (lbs) by one US automobile **per year**? (1 year = 365 days; 1 lb = 453.6 g) [5 pts]

$$\frac{0.38 \text{ kg}}{1 \text{ mi}} \times \frac{33 \text{ mi}}{1 \text{ day}} \times \frac{365 \text{ days}}{1 \text{ yr}} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} = \mathbf{1.0 \times 10^4 \text{ lbs CO}_2}$$