

Unit 1 Review – Intro to Chemistry

Name Key

Directions: Complete the problems below. Show all work if necessary. Be sure to include all units and round your answer to the correct number of sig figs

Determine the correct number of significant figures.

1. 97.0 3 2. 0.0123 3 3. 5100 2
 4. 0.410 3 5. 24.25000 7 6. 2425000 4

Solve the following problems and round to the correct number of significant figures.

7. $(2.57 \times 10^3 \text{ L}) \times (4.02 \times 10^5 \text{ L}) = 10.3 \times 10^8 \text{ L}^2 = \boxed{1.03 \times 10^9 \text{ L}^2}$
 8. $(9.7 \times 10^5 \text{ g}^3) / (3.41 \times 10^7 \text{ g}) = 2.8 \times 10^{-2} \text{ g}^2$
 9. $25.01 \text{ cm} + 2 \text{ cm} + 3.00007 \text{ cm} = 30.01007 \text{ cm} = 30 \text{ cm}$

Solve the following problems using the correct metric conversions. Be sure to include all work, units and round to significant figures.

10. $1.26 \text{ km} = \underline{126000} \text{ cm}$
 $1.26 \text{ km} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{100 \text{ cm}}{1 \text{ m}} = \underline{126,000 \text{ cm}}$

11. $321 \text{ ml} = \underline{.321} \text{ L}$
 $321 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} = \underline{.321 \text{ L}}$

12. $16.1 \text{ years} = \underline{\hspace{2cm}} \text{ seconds}$
 $16.1 \text{ yr} \times \frac{365 \text{ days}}{1 \text{ yr}} \times \frac{24 \text{ hr}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{60 \text{ sec}}{1 \text{ min}} = \boxed{5.08 \times 10^8 \text{ sec}}$
 $16.1 \times 3.1536 \times 10^7 = 50.77 \times 10^7$

Unit 2 Review – Matter

Name Key

1. What is the law of conservation of matter? Matter cannot be created or destroyed in any chemical or physical change, just transferred.

Identify the following as an element, compound or homogeneous mixture or heterogeneous mixture.

2. Sugar ($C_6H_{12}O_6$) C

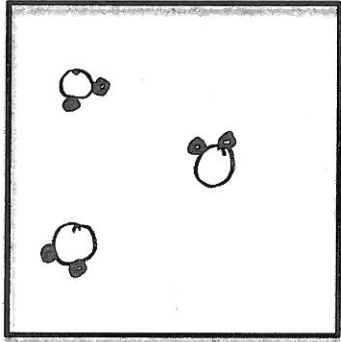
3. Gasoline Homog. M

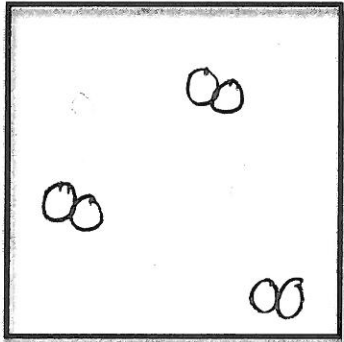
4. Nickel (Ni) E

5. Pizza Hetero. M

6. Water C

7. Air Homog. M

8. 
C

9. 
E

Identify the following as a chemical change, physical change, physical property or chemical property

10. Milk souring CC

11. Ice melting PC

12. Flammability CP

13. Density PP

14. Reactivity CP

14. Baking a cake CC

15. What is the density of a substance with a mass of 2.45 g and a volume of 1.37 ml? Be sure to include units and round your answer to sig figs.

$$d = \frac{m}{V}$$

$$= \frac{2.45g}{1.37mL} = \boxed{1.79 \text{ g/mL}}$$

Unit 3 Review – Atomic Structure

Name Key

1-24 Complete the following charts.

Symbol	Atomic #	Atomic Mass	Mass #	# of protons	# of neutrons	# of electrons
Ca ⁺²	20	40.08	40	20	20	18
Bismuth-210	83	210	210	83	127	83
²²⁶ Ra	88	226	226	88	138	88

Symbol	# of protons	# of neutrons	# of electrons	Neutral atom or ion?	Isotope Yes or No
¹¹² ₄₈ Cd ²⁺	48	64	46	ion	no
¹⁸⁷ ₇₆ Os	76	111	76	neutral	yes

25 - 32. Match the atomic model, experiment, theory or accomplishment with the correct scientist. You may assign more than one letter to a scientist.

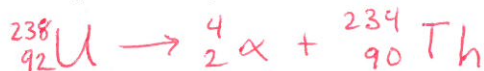
- I
- A, I
- K, D
- F, A
- G, B, J
- B, J
- C
- E

- Democritus
- John Dalton
- J.J. Thomson
- Robert Millikan
- Ernest Rutherford
- Niels Bohr
- Werner Heisenberg
- Erwin Schrodinger

- A. Determined the mass of an electron
- B. Planetary Model
- C. Uncertainty Principle
- D. Plum Pudding Model
- E. Quantum Mechanical Model
- F. Oil Drop Experiment
- G. Named the core the atom a nucleus
- H. Developed the Atomic Theory of Matter
- I. Model of the atom was a sphere
- J. Gold Foil Experiment
- K. Called negative particles electrons

Write the radioactive decay equation for the following processes.

33. Alpha decay of uranium – 238



34. Beta decay of Iodine – 151



Cobalt			
Write the complete electron configuration	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$		
Write the abbreviated electron configuration	$[Ar] 4s^2 3d^7$		
Draw the orbital diagram			
How many valence electrons?	2 ($4s^2$)	How many unpaired electrons are present?	3 (look @ 3d)

Mg^{2+}			
Write the complete electron configuration	$1s^2 2s^2 2p^6 3s^0$		
Write the abbreviated electron configuration	$[He] \cancel{2s^2 2p^6}$		
Draw the orbital diagram			
How many valence electrons?	0	How many unpaired electrons are present?	0

Define the following:

- Aufbau Principle – Electrons fill from the lowest energy level to the higher levels in order. Electrons are LAZY.
- Pauli Exclusion Principle – Electrons can go into orbitals in pairs, if they have opposite spins.
- Hund's Rule – Electrons will fill the ~~equal~~ equal energy orbitals one at a time until each orbital has one electron. Then they will pair up, with electrons of opposite spin. Electrons are UNFRIENDLY.

1. For each of the following sets of atoms, rank the atoms from smallest to largest **atomic radius**.

a. C, Al, O, P

O, C, P, Al

b. S, O, Ne, Al

Ne, O, S, Al

2. For each of the following sets of atoms, rank them from smallest to largest **ionization energy**.

a. Mg, Si, S, Sb, Sn

Sn, Sb, Mg, Si, S

b. Mg, Al, Ba, At, As

At, Ba, As, Mg, Al

3. For each of the following sets of atoms, rank them from lowest to highest **electronegativity**.

a. Si, P, O, Fr, K

Fr, K, Si, P, O

b. K, Mg, P, Ca, Rn

Rn, K, Ca, Mg, P

4. **Determine the mistake** in the arrangement of the following atoms from lowest to highest electronegativity.

Cs, Mo, Tc, Mn, Fe, Ge, Si, Ar

Argon (a noble gas) has no electronegativity.

5. **Determine the mistake** in the arrangement of the following atoms from lowest to highest atomic radius.

P, S, As, Ge, Sr, Fr

6. **Determine the mistake** in the arrangement of the following atoms from lowest to highest ionization energy.

F, S, Sn, Tl
opposite order, this is high \rightarrow low

Write the name for the following **ionic or covalent compounds**:

1. NaBr sodium bromide
2. $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ calcium acetate
3. P_2O_5 diphosphorus pentoxide
4. $\text{Ti}(\text{SO}_4)_2$ titanium (IV) sulfate
5. FePO_4 iron (III) phosphate
6. K_3N potassium nitride
7. SO_2 sulfur dioxide
8. CuOH copper (I) hydroxide
9. $\text{Zn}(\text{NO}_2)_2$ zinc nitrite
10. CuCl_2 copper (II) chloride

Write the formula for the following **ionic or covalent compounds**

11. Silicon dioxide SiO_2
12. Nickel (III) sulfide Ni_2S_3
13. Manganese (II) phosphate $\text{Mn}_3(\text{PO}_4)_2$
14. Silver acetate $\text{AgC}_2\text{H}_3\text{O}_2$
15. Diboron tetrabromide B_2Br_4
16. Calcium fluoride CaF_2
17. Potassium carbonate K_2CO_3
18. Ammonium oxide $(\text{NH}_4)_2\text{O}$
19. Tin (IV) selenide SnSe_2
20. Carbon tetrachloride CCl_4

Based on their electronegativities, indicate whether the bonds formed would be nonpolar covalent, polar covalent, or ionic.

21. O-H polar covalent
22. C-H nonpolar covalent
23. H-H Nonpolar covalent
24. K-F ionic