

**Semester 1 Final Review***Honors*

- Convert between standard form and scientific notation.
  - $8,9000,000 =$  \_\_\_\_\_
  - $0.00056 =$  \_\_\_\_\_
  - $4.5 \times 10^{-8} =$  \_\_\_\_\_
  - $2.7 \times 10^4 =$  \_\_\_\_\_
- Convert between the units indicated.
  - $35 \text{ cm} =$  \_\_\_\_\_  $\text{m}$
  - $280 \text{ mL} =$  \_\_\_\_\_  $\text{L}$
  - $0.0068 \text{ ms} =$  \_\_\_\_\_  $\mu\text{s}$
  - $1400 \text{ mg} =$  \_\_\_\_\_  $\text{kg}$
- Complete the following temperature conversions.
  - \_\_\_\_\_  $^{\circ}\text{C} = 300^{\circ}\text{F} =$  \_\_\_\_\_  $\text{K}$
  - $-20^{\circ}\text{C} =$  \_\_\_\_\_  $^{\circ}\text{F} =$  \_\_\_\_\_  $\text{K}$
- Complete the following conversions.
  - $8.25 \text{ km} =$  \_\_\_\_\_  $\text{miles}$
  - $6.5 \times 10^4 \text{ cm}^2 =$  \_\_\_\_\_  $\text{in}^2 =$  \_\_\_\_\_  $\text{m}^2$
  - $12.5 \text{ m/s} =$  \_\_\_\_\_  $\text{miles/hour}$
- Perform the following calculations. Give the answer with the correct number of significant figures.
  - $9.409 + 2.0 =$
  - $66.0 \times 1.000 =$
  - $10.0 / 5.0 =$
  - $3.05 - 1.540 =$
- A gold block measures 1.50 cm by 1.00 cm by 0.900 cm.
  - What is the volume of the block?
  - What is the density of gold?
  - What is the mass of the block?
- A graduated cylinder contains 50 mL of water. When a small stone is placed in the graduated cylinder the water level rises to 55 mL. If the stone weights 20 g, what is the density?

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8. Determine the number of protons, electrons, and neutrons in each of the following.
  - a. Cr
  - b. Br<sup>-</sup>
  - c. Sr<sup>2+</sup>
  
9. Draw a Bohr Diagram for the following elements. Include the number of protons, electrons, and neutrons.
  - a. N
  - b. Ca
  
10. Chromium has four isotopes: Chromium-50 (4.35 %), chromium-52 (83.7%), Chromium-53 (9.50 %), and chromium-54 (2.37%).
  - a. Determine the number of neutrons in each isotope.
  - b. Determine the average atomic mass of Chromium
  
11. A radio wave has a wavelength of 5.01 m. Determine the frequency of the radio wave. What is the energy of the radio wave?
  
12. UV radiation has a frequency of  $5.0 \times 10^{15}$  Hz. Determine the wavelength of the UV radiation. What is the energy of the UV radiation?
  
13. Write orbital notation for the following elements/ions.
  - a. Si
  - b. V
  - c. S<sup>2-</sup>
  
14. Write electron configuration for the following elements/ions.
  - a. Cl

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b. Ge

c.  $Y^{3+}$

15. Write noble gas notation for the following elements/ions.

a. Rb

b. Sc

c.  $I^-$

16. Determine the number of valence electrons in each of the following elements:

a. S

b. Ca

c. Ar

17. Complete the following table.

	Na or P?	Li or K?
Electron Configuration	Na: P:	Li: K:
Which element has a larger atomic radius? Explain.		
Which element has a higher ionization energy? Explain.		
Which element has a higher electronegativity? Explain.		

18. Which has a larger radius, the atom or the ion? Explain.

a. P or  $P^{3-}$

b. Zr or  $Zr^{4+}$

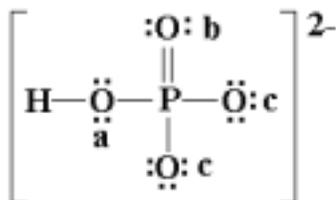
19. For each molecule: 1. Draw the Lewis Structure. 2. Draw the VSEPR diagram and classify the shape of the molecule.

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a. OF <sub>2</sub>	b. PF <sub>3</sub>
c. PH <sub>3</sub>	d. CBr <sub>4</sub>
e. SF <sub>6</sub>	f. BF <sub>3</sub>
g. CS <sub>2</sub>	h. H <sub>2</sub> O

20. The Lewis Structure for the polyatomic ion hydrogen phosphate, HPO<sub>4</sub><sup>2-</sup>, is shown below. Determine the total number of valence electrons for the ion. Calculate the formal charge on each atom.



21. Classify the following substances as mixtures or pure substances. Classify whether each mixture is heterogeneous or homogeneous and whether each pure substance is a compound or element.

Substance	Classification
A taco	
Salt	
Sliver	
Chocolate milk	

22. Name the following compounds.

a. LiCl	_____	b. H <sub>2</sub> CO <sub>2</sub>	_____
c. MgCO <sub>3</sub>	_____	d. FePO <sub>4</sub>	_____
e. CuS	_____	f. CCl <sub>4</sub>	_____

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g.  $\text{NiCl}_3$  \_\_\_\_\_ h.  $\text{HBr}$  \_\_\_\_\_  
i.  $\text{N}_2\text{O}_5$  \_\_\_\_\_ j.  $\text{MnO}_2$  \_\_\_\_\_

23. Write the chemical formula for the following compounds.

a. sodium sulfide	_____	b. cobalt (II) chloride	_____
c. lithium carbonate	_____	d. scandium borate	_____
e. chromium (III) oxide	_____	f. sulfur hexafluoride	_____
g. nitrogen dioxide	_____	h. hydroiodic acid	_____
i. iodic acid	_____	j. lead (IV) sulfide	_____

24. Determine the molar mass of the following elements/compounds

a. phosphorous                      b. chlorine                      c. calcium fluoride                      d.  $\text{MgCO}_3$

25. Complete the following mole conversions.

- a. 0.25 mol Al = \_\_\_\_\_ g Al
- b. 45 g NaCl = \_\_\_\_\_ mol NaCl
- c.  $2.25 \times 10^{23}$  atoms Au = \_\_\_\_\_ mol Au
- d. 220 g magnesium chloride = \_\_\_\_\_ molecules of magnesium chloride
- e.  $5.0 \times 10^{24}$  molecules of potassium phosphate = \_\_\_\_\_ kg of potassium phosphate

26. If there are 400 molecules of water, how many atoms are there of hydrogen and oxygen?

27. Calculate the percent composition of each element in the following compounds.

- a.  $\text{Na}_2\text{S}$
- b. Silver nitrate

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28. Determine the empirical formula for the following compounds. Name each compound.

a. 36.5% Na, 25.4 % S, 38.0% O

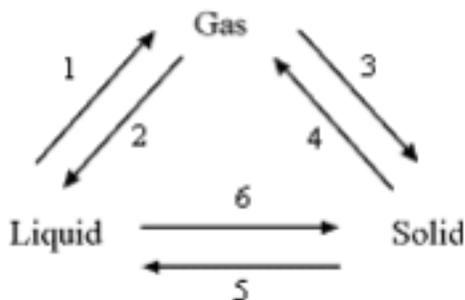
b. 32.4 % Na, 22.6 % S, 45.1 %O

29. A 10.0 g sample of powder was found to contain 1.36 g lithium, 2.36 g carbon, and the remainder was oxygen. The molecular weight of the compound is 101.898 g/mol. Determine the empirical and molecular formula. Name the molecular compound.

30. Compare the phases of matter.

State	Molecular Motion	Molecular spacing	Spread to fill a container?	Compressible?
Solid				
Liquid				
gas				

31. Complete the following diagram by labelling the phase change.

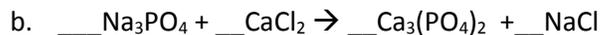


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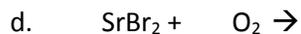
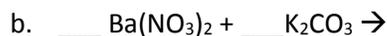
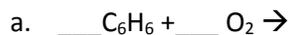
32. Classify each of the following changes as chemical or physical and explain why with a piece of evidence.

Change	Classification	Explanation
a. When heated, calcium carbonate decomposes into calcium oxide and carbon dioxide		
b. copper metal is stretched into a wire		
c. a popsicle is frozen		
d. a banana turns brown over time		

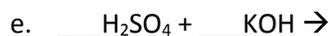
33. Classify the reactions as synthesis (S), decomposition (D), Single replacement (SR), Double Replacement (DR), Combustion(C), or Neutralization (N). Then balance the chemical equation.



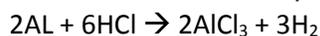
34. Classify the reactions as synthesis (S), decomposition (D), Single replacement (SR), Double Replacement (DR), Combustion(C), or Neutralization (N). Predict the products and then balance the chemical equation.



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35. Aluminum reacts with hydrochloric according to the following balanced chemical equation:

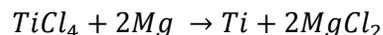


- If 0.250 mol of Al reacts, determine the moles of H<sub>2</sub> produced.
- If 5.0 mol of AlCl<sub>3</sub> are produced, determine the moles of HCl reacting.
- If 50.0 g of Al react, what mass of HCl is required? What is the mass of each of the products?

36. Ammonia (NH<sub>3</sub>), is prepared by combining hydrogen and nitrogen.

- Write a balanced chemical equation for the reaction.
- When 28 g of nitrogen are reacted, what mass of hydrogen is required?
- If the reaction yields 30 g of ammonia, what is the percent yield of the reaction?

37. Titanium (IV) chloride reacts with magnesium to form titanium and magnesium chloride according to the following balanced chemical equation:



- If 100 g of titanium (IV) chloride are reacted with 40.0 g of magnesium, which reactant is limiting and which is in excess?
- What is the mass of each of the products?
- What mass of the excess reactant is used in the reaction and what mass of the excess reactant remains after the reaction?
- If only 21.0 g of titanium is produced, what is the percent yield of the reaction? What mass of magnesium chloride will be produced?