

ACCEL. QUARTER 1 CUMULATIVE REVIEW

Name/Per.: Key

This is a list of ideas & concepts you should be able to do on the semester test & will be covered on the First Quarter Test.

Unit 1- Atomic Structure and Nuclear Decay

- Why do scientists believe that hydrogen and helium are the building blocks of all other elements?
because elements are formed through H + He fusion in stars
- How does a star produce such enormous amounts of heat and light?
hydrogen fusion
- How are elements heavier than Fe formed?
supernova explosions
- How do scientists identify which elements are present in the stars?
emission spectra

5.

	Location	Charge	Mass
Electron	e ⁻ cloud	-	0 amu
Proton	nucleus	+	1 amu
Neutron	nucleus	0	1 amu

6.

Isotope Name	Isotope Symbol	Protons	Electrons	Neutrons	Mass #	Atomic #
Argon-42	$^{42}_{18}\text{Ar}$	18	18	24	42	18
Barium-136	$^{136}_{56}\text{Ba}$	56	56	80	136	56
Titanium 48	$^{48}_{22}\text{Ti}$	22	22	26	48	22

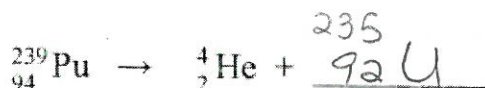
7. Boron has two naturally occurring isotopes, boron-10 and boron-11. The relative abundance of boron-10 is 19.9%; the relative abundance of boron-11 is 80.1%. The atomic mass of boron-10 is 10.01 amu and the atomic mass of boron-11 is 11.01 amu. What is the average atomic mass of boron? Show all of your work including the equation.

$$\begin{aligned} \text{avg atomic mass} &= \text{mass}_1 \times \text{abundance}_1 + \text{mass}_2 \times \text{abundance}_2 + \dots \\ &= 10.01(.199) + 11.01(.801) \\ &= \boxed{10.811 \text{ amu}} \end{aligned}$$

8.

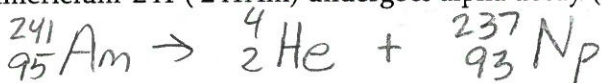
	Symbol (Greek Letter)	Symbol (Isotope Notation)	Charge	Change in atomic number	Change in mass number
Beta particle	β	$^0_{-1}\text{e}$	-	1	0
Alpha particle	α	^4_2He	+2	2	4

9. Complete the following nuclear reactions:

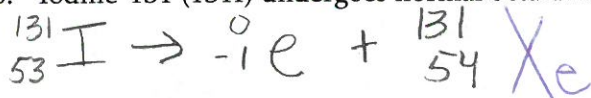


10. Write the balanced equation for the nuclear reaction described in each of the following processes:

a. Americium-241 (^{241}Am) undergoes alpha decay (inside a smoke detector)



b. Iodine-131 (^{131}I) undergoes normal beta decay (used in therapy for hyperthyroidism)



Unit 2: The Periodic Table

1. Name the period 2 halogen

Fluorine (F)

2. Name the group 13, period 5 element

Indium (In)

3. Name the period 2, alkaline-earth metal

Beryllium (Be)

4. Is U a representative element, transition metal, or inner transition metal?

inner transition metal

5.

Element	Metal, metalloid, or nonmetal?	Representative or Transition Element?	Group Number
Fe	metal	transition	8
Si	metalloid	representative	14
He	nonmetal	representative	18
Na	metal	representative	1
Al	metal	representative	13

6.

	Trend Across a Period (L-R)	Why?	Trend Down a Group (top to bottom)	Why?
Atomic Radius	decreases	protons being added pulls e^- closer in	increases	energy levels being added
Ionic Radius	decreases	"	increases	"
Ionization Energy	increases	"	decreases	"
Electronegativity	increases	"	decreases	"

7. Circle the element in each pair that has the highest electronegativity:

a. K or Mg

b. Mg or S

c. F or He

8. Circle the element with the largest atomic radius.

a. Al or B

b. S or O

c. Br or Cl

9. Give the orbital notations (diagrams, configurations) for these elements.

a. Na $1s^2 2s^2 2p^6 3s^1$

b. C $1s^2 2s^2 2p^2$

c. Kr $1s^2 2s^2 2p^6 3s^2 3p^4 4s^2 3d^{10} 4p^6$

10. Give the complete ground state electron configuration for these elements.

- a. Ne $1s^2 2s^2 2p^6$
 b. Pd $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^8$
 c. At $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^5$

11. Give the noble gas configuration (notation) for these elements.

- a. P $[Ne] 3s^2 3p^3$ b. Ga $[Ar] 4s^2 3d^{10} 4p^1$ c. Rb $[Kr] 5s^1$

12. Looking at the periodic table, how would the electron configurations for the following elements end?

- a. S $3p^4$ b. Cl $3p^5$ c. Mg $3s^2$ d. Xe $5p^6$

13. What is the octet rule?

atoms gain, lose, or share e^- to obtain a full set of 8 valence e^-

14. How many valence electrons do the following elements have?

- a. Si 4 b. Ca 2 c. Br 7 d. Ar 8

15. Draw the electron dot structures for the following elements.

- a. Arsenic $\cdot\overset{\cdot}{\text{As}}\cdot$ b. Cesium Cs c. Boron $\overset{\cdot}{\text{B}}\cdot$ d. xenon $:\overset{\cdot\cdot}{\text{Xe}}:$

Unit 3 & 4: Bonding

1. Be able to tell and show how atoms gain and lose electrons to become stable. Use electron dot structures to show how nitrogen and calcium form a compound. Include the formula and name of the compound.



2. Complete the following statements. Insert the correct numbers into the blanks.

- a. Barium has 2 valence electrons and will (gain/lose) lose electrons to become stable making it a(n) cation (cation/anion).
 b. Oxygen has 6 valence electrons and will (gain/lose) gain electrons to become stable, making it a(n) anion (cation/anion).

3. Be able to write formulas and names for binary ionic compounds. Write the name or formula for the following:

- a. KBr potassium bromide c. Sodium iodide NaI
 b. Calcium chloride CaCl_2 d. Cs_3N cesium nitride

4. Be able to write formulas and names for transition metal compounds. Remember the () and Roman numeral in the NAME. Write the name or formula for the following:

- a. SnCl_2 tin (II) chloride c. Copper (I) sulfate Cu_2SO_4
 b. Iron (III) sulfide Fe_2S_3 d. MnO manganese (II) oxide

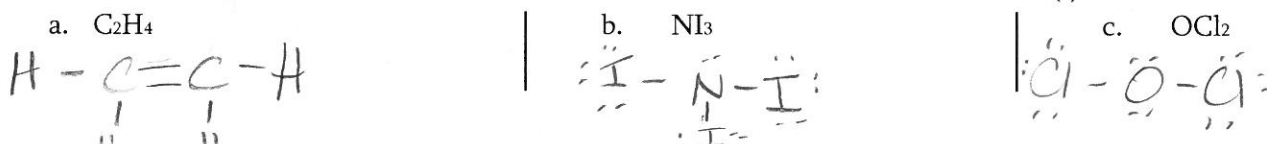
5. Be able to write the formulas and names for compounds containing polyatomic ions. Remember the () when more than one polyatomic ion is needed. Write the name or formula for the following:

- a. NH_4NO_3 ammonium nitrate c. Aluminum hydroxide $\text{Al}(\text{OH})_3$
 b. Sodium carbonate Na_2CO_3 d. $\text{Mg}_3(\text{PO}_4)_2$ magnesium phosphate

6. Be able to name covalent compounds. Name the following compounds:

- a. P_2O_5 diphosphorus pentoxide c. SO_3 sulfur trioxide
 b. CO_2 Carbon dioxide d. CCl_4 Carbon tetrachloride

7. Be able to draw Lewis structures for covalent molecules. Draw the Lewis structure(s) for each of the following:



8. What is the shape of 7b above? trigonal pyramidal
9. What is the shape of 7c above? hex
10. Know the properties of ionic bonds and compounds. List them.
 metal + nonmetal opposite charges
 conduct electricity
 high melting & boiling points
 crystal lattice structure
 solids at room temp.
 transfer electrons
11. Know the properties of covalent bonds and compounds. List them.
 nonmetals
 share electrons
 low melting & boiling points
 do not conduct electricity
12. Determine the types of bonds that are present in the following compounds (ionic or covalent):
- | | | | |
|---------------------|-----------------|-----------------------------------|-----------------|
| a. Lead (II) oxide | <u>ionic</u> | d. Copper (I) sulfate | <u>ionic</u> |
| b. Nitrogen dioxide | <u>covalent</u> | e. As ₂ O ₅ | <u>covalent</u> |
| c. NaI | <u>ionic</u> | f. Copper (II) chloride | <u>ionic</u> |
13. What is the main intermolecular force acting on the following molecules?
- | | | | | | |
|--------------------|----------------------|--------------------|------------|--------------------|----------------------|
| a. NH ₃ | <u>hydrogen bond</u> | b. CH ₄ | <u>LDF</u> | c. SF ₂ | <u>dipole-dipole</u> |
|--------------------|----------------------|--------------------|------------|--------------------|----------------------|
14. Put the following in order of increasing melting point: F₂, CaCl₂, NH₃, CBr₄ F₂, CBr₄, NH₃, CaCl₂

Vocabulary:

Define the following vocabulary words on a separate sheet of paper and attach it to this sheet.

Starred (*) terms will be found in your Earth Science textbook or your unit 1 notes.

- | | | | |
|------------------|------------------------|-------------------|----------------------|
| a. Fusion* | f. average atomic mass | k. Anion | p. Crystal Lattice |
| b. Fission* | g. nuclear reaction | l. Cation | q. Covalent Bond |
| c. Supernova* | h. period | m. Ionic bond | r. Molecule |
| d. atomic number | i. group | n. Polyatomic ion | s. Valence electrons |
| e. mass number | j. electronegativity | o. Electrolyte | t. VSEPR model |