

CHEMISTRY 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

1. Why do scientists believe that hydrogen and helium are the building blocks of all other elements?

big of the fusion in stars → younger stars are made of He & H

2. How does a star produce such enormous amounts of heat and light?

through nuclear fusion

3. How are elements heavier than Fe formed?

supernova

4. How do scientists identify which elements are present in the stars?

analyze emission spectra's

5.

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

6.

Isotope Name	Isotope Symbol	Protons	Electrons	Neutrons	Mass #	Atomic #
Argon-42	⁴² ₁₈ Ar	18	18	24	42	18
Barium-136	¹³⁶ ₅₆ Ba	56	56	80	136	56
Titanium 48	⁴⁸ ₂₂ Ti	22	22	26	48	22

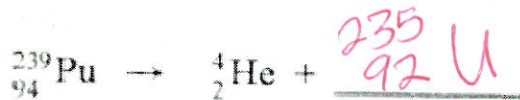
7. Boron has two naturally occurring isotopes, boron-10 and boron-11. The relative abundance of boron-10 is 19.9%; the relative abundance of boron-11 is 80.1%. The atomic mass of boron-10 is 10.01 amu and the atomic mass of boron-11 is 11.01 amu. What is the average atomic mass of boron? Show all of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

$$(10.01 \times .199) + (11.01 \times .801) = 10.811 \text{ amu}$$

8.

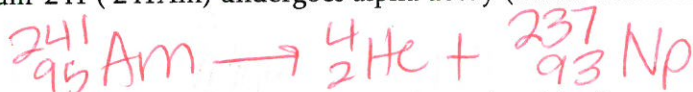
	Symbol (Greek Letter)	Symbol (Isotope Notation)	Charge	Change in atomic number	Change in mass number
Beta particle	β	⁰ ₋₁ e ⁻	-1	+1	0
Alpha particle	α	⁴ ₂ He	+2	-2	-4

9. Complete the following nuclear reactions:

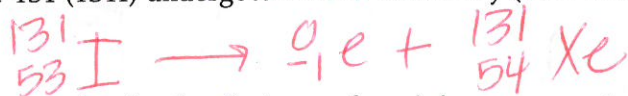


10. Write the balanced equation for the nuclear reaction described in each of the following processes:

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)



11. Match the type of emitted radiation to the minimum amount of shielding required to stop it:

A. alpha particle

C several lead bricks

B. beta particle

A paper

C. gamma ray

B thin piece of lead

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	represent.	14
He	nonmetal	represent.	18
Na	metal	represent	1
W	metal	transition	6
Al	metal	represent	13
Sb	metalloid	represent	15

6.

	Trend Across a Period (L-R)	Why?	Trend Down a Group (top to bottom)	Why?
Atomic Radius	decreases	increased nuclear charge	increases	increased electron shielding
Electronegativity	increases	increased nuclear charge	decreases	increased electron shielding

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

a. K or Mg

b. Mg or S

c. F or He

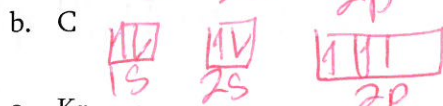
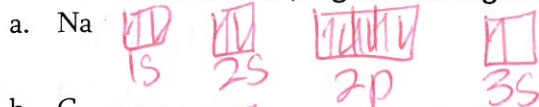
8. Circle the element with the largest atomic radius.

a. Al or B

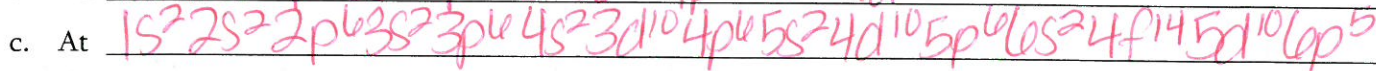
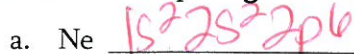
b. S or O

c. Br or Cl

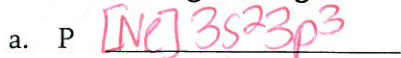
9. Give the orbital notations (diagrams, configurations) for these elements.



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



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



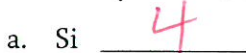
12. Looking at the periodic table, how would the electron configurations for the following elements end?



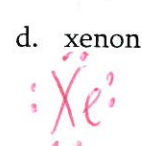
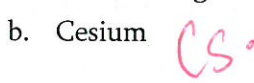
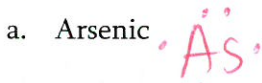
13. What is the octet rule?

elements will gain/lose or share electrons to achieve an octet (8 valence electrons) (full outer shell)

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



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



Unit 3: Bonding

1. 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) $lose 2$ electrons to become stable making it a(n) (cation/anion).

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

3. Write the name or formula for the following:

a. KBr potassium bromide

c. Sodium iodide NaI

b. Calcium chloride calcium chloride

d. Cs₃N cesium nitride

e. SnCl₂ tin (II) chloride

g. Copper (I) sulfate Cu₂SO₄

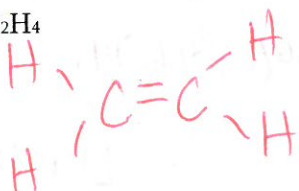
f. Iron (III) sulfide Fe₂S₃

h. MnO manganese (II) oxide

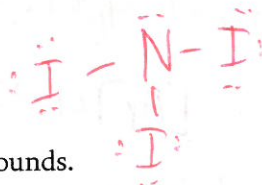
- i. NH_4NO_3 ammonium nitrate
 j. Sodium carbonate Na_2CO_3
 k. Aluminum hydroxide $\text{Al}(\text{OH})_3$
 l. $\text{Mg}_3(\text{PO}_4)_2$ magnesium phosphate
 m. P_2O_5 diphosphorus pentoxide
 o. SO_3 sulfur trioxide
 n. CO_2 carbon dioxide
 p. CCl_4 carbon tetrachloride

4. Draw the Lewis structure(s) for each of the following:

a. C_2H_4



b. NI_3



c. OCl_2



5. List the properties of ionic bonds and compounds.

- brittle
- opp. charges
- transfer electrons
- crystal lattice structure
- high melting pt.
- high boiling pt.
- good conductors

6. List the properties of covalent bonds and compounds.

- shares electrons
- Lewis structures
- has bonding & shared pairs
- poor conductors
- low melting pt.
- low boiling pt.

7. Determine the types of bonds that are present in the following compounds (ionic or covalent):

a. Lead (II) oxide

PbO ionic

d. Copper (I) sulfate

ionic

b. Nitrogen dioxide

NO_2 cov.

e. As_2O_5

covalent

c. NaI

sodium iodide

f. Copper (II) chloride

ionic

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 |