Name: _____ **Date:** _____

Chemistry *~ Ms. Hart* **Class:** Anions or Cations

THE URBAN ASSEMBLY SCHOOL FOR CRIMINAL JUSTICE

4.4 Review of Unit 4

Review valence electrons:

The outermost electrons in an atom are called the **valence electrons**. These electrons are especially important because they interact with other atoms in chemical bonds. The valence electrons are those electrons in the highest energy level. When the electron configuration is known, the number of valence electrons can be determined by looking at the outermost energy level. The number of valence electrons can also be determined by simply determining the group number on the periodic table. The last digit of the group number indicates the number of valence electrons.

Use your periodic table to answer the following questions.

1. Tin has _____ valence electrons, and chlorine has _____ valence electrons.
2. Three elements that have eight valence electrons are _____, _____, and _____.
3. Each of the atoms in alkali earth metal family (group 2) has _____ valence electrons.
4. Sodium has _____ valence electrons, and bismuth has _____ valence electrons.
5. Iodine has seven valence electrons. Which other elements have seven valence electrons?

Lewis Dot Structures:

A system of tracking valence electrons was developed by G. N. Lewis. In this system the element symbol is written to represent an atom and dots are written around the symbol to represent valence electrons. The dots are generally spaced out evenly. We place a maximum of two dots on each side.

Follow these simple steps to draw Lewis dot structures:

1. Draw the symbol of the element on paper.
2. Figure out the number of valence electrons for the element;
3. Draw dots around the element symbol to represent valence electrons of the atom. Be sure to have the correct number of electrons.

Lewis Dot Structures – Practice

1. phosphorus
2. carbon
3. silicon
4. magnesium
5. neon
6. Identify element X 

   (There may be more than 1 answer)

7. Identify element X 

(There may be more than 1 answer)

Bonus: If the atom is an ion, add or subtract electrons corresponding to the charge of the ion. (e.g. +3 means its missing 3 electrons; -3 means it gained 3 electrons). Draw the Lewis dot structure for the following ions:

Na^{+1} F^{-1} Ca^{+2}

What do you notice about the Lewis dot structures for the 3 ions above?

_____

Base your answer on the reading passage and on your knowledge of chemistry. Please sure to annotate the text as you read using our annotation strategies.

A Glow in the Dark, and Scientific Peril

The [Marie and Pierre] Curies set out to study radioactivity in 1898. Their first accomplishment was to show that radioactivity was a property of atoms themselves. Scientifically, that was the most important of their findings, because it helped other researchers refine their understanding of atomic structure.

More famous was their discovery of polonium and radium. Radium was the most radioactive substance the Curies had encountered. Its radioactivity is due to the large size of the atom, which makes the nucleus unstable and prone to decay, usually to radon and then lead, by emitting particles and energy as it seeks a more stable configuration.

Marie Curie struggled to purify radium for medical uses, including early radiation treatment for tumors. But radium's bluish glow caught people's fancy, and companies in the United States began mining it and selling it as a novelty: for glow-in-the-dark light pulls, for instance, and bogus cure-all patent medicines that actually killed people.

What makes radium so dangerous is that it forms chemical bonds in the same way as calcium, and the body can mistake it for calcium and absorb it into the bones. Then, it can bombard cells with radiation at close range, which may cause bone tumors or bone-marrow damage that can give rise to anemia or leukemia.

— Denise Grady, *The New York Times*, October 6, 1998

Using information from the Periodic Table, explain why radium forms chemical bonds in the same way as calcium does.

_____

_____

_____

_____

_____

_____

Name: _____ **Date:** _____

Chemistry *~ Ms. Hart* **Class:** Anions or Cations

THE URBAN ASSEMBLY SCHOOL FOR CRIMINAL JUSTICE

4.4 Practice Regents Questions

1. The elements on the Periodic Table are arranged in order of increasing
   (1) atomic mass
   (2) atomic number
   (3) molar mass
   (4) oxidation number

2. Which list includes elements with the most similar chemical properties?
   (1) Br, Ga, Hg
   (2) Cr, Pb, Xe
   (3) O, S, Se
   (4) N, O, F

3. Compared to the atoms of nonmetals in Period 3, the atoms of metals in Period 3 have
   (1) fewer valence electrons
   (2) more valence electrons
   (3) fewer electron shells
   (4) more electron shells

4. Which element has chemical properties that are most similar to the chemical properties of sodium?
   (1) beryllium
   (2) calcium
   (3) lithium
   (4) magnesium

5. Which statement identifies the element arsenic?
   (1) Arsenic has an atomic number of 33.
   (2) Arsenic has a melting point of 84 K.
   (3) An atom of arsenic in the ground state has eight valence electrons.
   (4) An atom of arsenic in the ground state has a radius of 146 pm.

6. Which Lewis electron-dot diagram represents a nitrogen atom in the ground state?
   (1) 
   (2) 
   (3) 
   (4) 

7. Which Lewis electron-dot diagram represents an atom in the ground state for a Group 13 element?
   (1) 
   (2) 

(3) 

(4) 

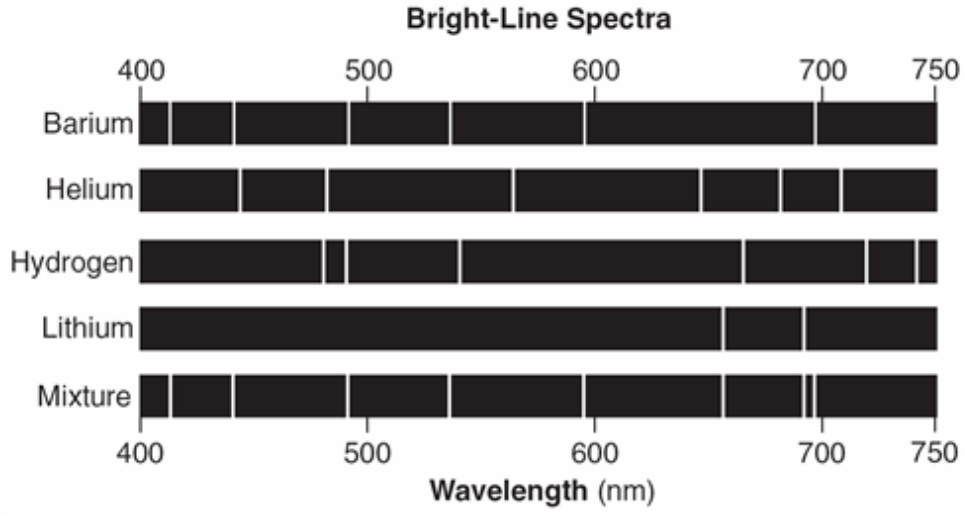
8. Which ion has no electrons?
   (1) H+
   (2) Li+
   (3) Na+
   (4) Rb+

9. In the ground state, which atom has a completely filled valence electron shell?
   (1) C
   (2) V
   (3) Ne
   (4) Sb

10. What is the total number of valence electrons in a germanium atom in the ground state?
    (1) 22
    (2) 2
    (3) 32
    (4) 4

11. What is the total number of valence electrons in a calcium atom in the ground state?
    (1) 8
    (2) 2
    (3) 18
    (4) 20

12. The diagram below represents the bright-line spectra of four elements and a bright-line spectrum produced by a mixture of two of these elements.



Which two elements are in this mixture?
   (1) barium and hydrogen
   (2) barium and lithium
   (3) helium and hydrogen
   (4) helium and lithium