

TEST REVIEW  
GCAA Chemistry  
Atoms

From the Hangman Game-----Match the answers correctly!

- |               |                     |               |                       |
|---------------|---------------------|---------------|-----------------------|
| A. Excited    | B. Energy           | C. Orbital    | D. Plum Pudding Model |
| E. Bohr       | F. Electron         | G. Frequency  | H. Neutron            |
| I. Thomson    | J. alpha particles. | K. Wavelength | L. John Dalton        |
| M. Rutherford | N. Ground State     | O. Nucleus    | P. Proton             |

\_\_\_C\_\_\_ 1. A region in space where an electron is found ---- or “the probable position of an electron.”

\_\_\_A\_\_\_ 2. An electron is at a higher energy level than normal. It has moved away from the nucleus.

\_\_\_D\_\_\_ 3. This atomic model said the that the atom was a solid, positively charged sphere with embedded negative charges.

\_\_\_L\_\_\_ 4. This scientist is given credit for discovering atoms.

\_\_\_O\_\_\_ 5. The center of the atom

\_\_\_E\_\_\_ 6. Used emission of light to develop the idea of electron energy levels in the atom

\_\_\_G\_\_\_ 7. The number of cycles per second---related to the energy of light.

\_\_\_H\_\_\_ 8. These subatomic particles do not have a charge.

\_\_\_F\_\_\_ 9. These subatomic particles have a negative charge.

\_\_\_I\_\_\_ 10. This scientist developed the plum pudding model of the atom, and discovered electrons.

\_\_\_P\_\_\_ 11. A positive subatomic particle with a mass of one amu

\_\_\_J\_\_\_ 12. A product of radioactive decay, these are the particles that Rutherford shot through the gold foil. They contain two protons and two neutrons.

\_\_\_K\_\_\_ 13. Each color of light has a specific \_\_\_\_\_. The shorter ones are higher in energy, and the longer are lower in energy.

\_\_\_B\_\_\_ 14. Electrons lose this when they fall from the excited state to the ground state.

\_\_\_M\_\_\_ 15. This scientist is given credit for discovering that the nucleus is a tiny mass at the center of the atom.

\_\_\_N\_\_\_ 16. These words describe an electron that is in its normal, unexcited position.

“Atom Basics” Section

\_\_\_D\_\_\_1. What is the smallest unit of an element that retains the properties of that element?

- a. a neutron            b. an electron            c. a proton            d. an atom

\_\_\_D\_\_\_2. What particles form the nucleus of an atom?

- a. protons            b. electrons            c. neutrons            d. protons and neutrons

\_\_\_A\_\_\_3. Electrons are negatively charged and have the least mass of the three sub-atomic particles

- a. True            b. False

\_\_\_A\_\_\_4. The charge of the nucleus is always\_\_\_\_\_

- a. positive            b. negative            c. neutral            d. cannot determine

\_\_\_C\_\_\_5. An isotope is an atom of a specific element with a varying number of \_\_\_\_\_.

- a. ions            b. protons            c. neutrons            d. electrons

\_\_\_B\_\_\_6. The nucleus of an atom is...

- a. negatively charged and has low density            b. positively charged and has a high density  
c. positively charged and has a low density            d. negatively charged and has a high density

\_\_\_A\_\_\_7. An atom is made up of mostly empty space in which the electrons occupy.

- a. True            b. False

\_\_\_C\_\_\_8. A neutral atom always has the...

- a. same number of protons and neutrons            b. same number of neutrons and electrons  
c. same number of protons and electrons            d. none of the above

\_\_\_B\_\_\_9. The number 84 in Krypton-84 represents the...

- a. atomic number            b. mass number            c. electrons            d. neutrons

\_\_\_C\_\_\_10. Electrons...

- a. circle the an atom’s nucleus in orbitals, which are paths like the planets orbit around the sun.  
b. are located in the nucleus.  
c. move around the nucleus in electron orbitals, which are regions of space where the electrons exist.  
d. move in the highest energy orbitals available to them

\_\_\_B\_\_\_11. Different isotopes of the same element have different atomic numbers.

- a. True            b. False

\_\_\_D\_\_\_12. All atoms of the same element have the same number of...

- a. neutrons                      b. mass number                      c. atomic masses                      d. protons

\_\_\_E\_\_\_13. Aluminum-27 has \_\_\_\_\_ neutrons.

- a. 10                      b. 11                      c. 12                      d. 13                      e. 14                      ab. 27

\_\_\_A\_\_\_14. Neon lights give off light when excited electrons fall back from higher energy levels to their ground state lower energy levels.

- a. True                      b. False

\_\_\_C\_\_\_15. How many *electrons* are in a -3 ion of Nitrogen-15.

- a. 4                      b. 7                      c. 10                      d. 11                      e. 17

\_\_\_B\_\_\_16. How many *protons* are in a -3 ion of Nitrogen-15?

- a. 4                      b. 7                      c. 10                      d. 11                      e. 17

\_\_\_F\_\_\_17. How many *neutrons* are in a -3 ion of Nitrogen-15? (note—the correct answer was not on the test distributed in class)

- a. 4                      b. 7                      c. 10                      d. 11                      e. 17                      f. 8

\_\_\_B\_\_\_18. Cations are positive ions. Do cations form by gaining electrons, or by losing electrons?

- a. gaining                      b. losing                      c. Electrons are not involved in the formation of ions

\_\_\_B\_\_\_19. What part of the atom is most involved in interactions between atoms?

- a. Protons                      B. Electrons                      C. Neutrons

\_\_\_D\_\_\_20. Element Z has 2 naturally occurring isotopes with the following percent abundance: the isotope with a mass of 20.0 amu is 25% abundant, while the isotope with a mass of 22.0 amu is 75% abundant. What is the average atomic mass for element Z?

- a. 20.0 amu                      b. 20.5 amu                      c. 21.0 amu                      d. 21.5 amu                      e. 22.0

## The Electron Cloud Section

\_\_\_C\_\_\_1. Which is the correct sequence in which the following sublevels will fill? (use the diagonal rule or the order on your periodic table)

- a. 1s, 2s, 3s, 4s, 2p, 3p, 4p, 3d  
b. 1s, 2s, 2p, 3s, 3p, 3d, 4s, 4p  
c. 1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p  
d. 1s, 2s, 2p, 3s, 3p, 4s, 4p, 3d

\_\_\_B\_\_\_2. Which is the correct sequence in which the following sublevels will fill?

- a. 4p, 4d, 4f, 5s, 5p, 5d, 5f, 6s, 6p, 6d, 7s  
b. 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s, 5f, 6d  
c. 5s, 6s, 7s, 4p, 5p, 6p, 4d, 5d, 6d, 4f, 5f  
d. 4p, 5s, 4d, 5p, 6s, 5d, 6p, 4f, 7s, 6d, 5f

\_\_\_C\_\_\_3. Which of the following has an invalid sublevel designation?

- a. 7s  
b. 3p  
c. 3f  
d. 5d  
e. 4f

\_\_\_B\_\_\_4. Orbitals are \_\_\_\_\_ of space around the nucleus where a/an \_\_\_\_\_ is likely to be located.

- a. paths, electron  
b. regions, electron  
c. path, neutron  
d. regions, neutron

\_\_\_E\_\_\_5. What is the maximum number of electrons that can exist in any p **sublevel**.

- a. 1  
b. 2  
c. 3  
d. 4  
e. 6

\_\_\_D\_\_\_6. What is the maximum number of electrons that can exist in any d **sublevel**.

- a. 1  
b. 2  
c. 6  
d. 10  
e. 14

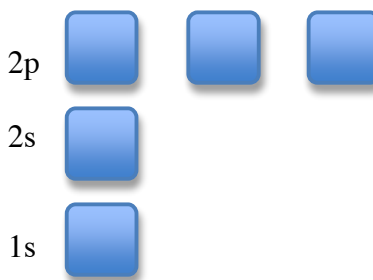
\_\_\_B\_\_\_7. Electrons which occupy the same orbital must have...

- a. the same spin  
b. the opposite spin  
c. no spin at all  
d. there cannot be two electrons in one orbital

\_\_\_D\_\_\_8. In the orbital diagram for nitrogen, how many electrons are unpaired in the 2p sublevel?

- a. 0  
b. 1  
c. 2  
d. 3  
e. 4

You will need to draw the diagram



\_\_\_C\_\_\_9. What sublevels are present in the third energy level?

- a) s only      b) s and p only      c) s, p, and d only      d) s, p, d, and f only

\_\_\_A\_\_\_10. How many **orbitals** are present in any p sublevel?

- a. 3                      b. 5                      c. 6                      d. 7                      e. 10

\_\_\_B\_\_\_11. When there is an option, will electrons pair up in orbitals, or will they go in one at a time until all are occupied?

- a. pair up first      b. fill all orbitals with one electron before pairing

\_\_\_C\_\_\_12. How many electrons are in the valence (outer) shell of oxygen?

- a. 2              b. 4              c. 6              d. 8

\_\_\_D\_\_\_13. What is the coefficient of the highest energy level in As?

- a. 1              b. 2              c. 3              d. 4              e. 5

\_\_\_B\_\_\_14. Which subatomic particles are transferred from one atom to another during the formation of an ionic compound?

- a. protons              b. electrons              c. neutrons

#15-18. Matching

- |                    |                       |
|--------------------|-----------------------|
| ___a___1. d- block | a. contains vanadium  |
| ___d___2. f-block  | b. contains lead      |
| ___c___3. s- block | c. contains Magnesium |
| ___b___4. p-block  | d. contains Uranium   |

19-20. Arrange the following sublevels in order of increasing energy (Place 1 in the blank for the lowest energy and 8 for the highest energy).

- \_\_\_2\_\_\_ 3d      \_\_\_1\_\_\_ 2s      \_\_\_4\_\_\_ 5p      \_\_\_5\_\_\_ 4f      \_\_\_6\_\_\_ 6p      \_\_\_3\_\_\_ 5s      \_\_\_7\_\_\_ 5f      \_\_\_8\_\_\_ 6d

## Atoms and Ions

1 – 16: ATOMS (data in bold regular font. Answers in italics)

Symbol	Atomic #	Mass #	# p <sup>+</sup>	#e <sup>-</sup>	#n <sup>0</sup>	Hyphen Notation
<i>Si</i>	<b>14</b>	<b>27</b>	<i>14</i>	<i>14</i>	<i>13</i>	<i>Silicon - 27</i>
<i>Bi</i>	<i>83</i>	<i>208</i>	<i>83</i>	<b>83</b>	<b>125</b>	<i>Bismuth - 208</i>
<i>Rb</i>	<i>37</i>	<i>88</i>	<i>37</i>	<i>37</i>	<i>51</i>	<b>Rubidium-88</b>

17 – 35: IONS

Symbol	Atomic #	Mass #	# p <sup>+</sup>	#e <sup>-</sup>	#n <sup>0</sup>	Charge
<b>Zn<sup>+2</sup></b>	<i>30</i>	<i>65</i>	<i>30</i>	<i>28</i>	<i>35</i>	<i>+2</i>
<i>P<sup>-3</sup></i>	<i>15</i>	<i>31</i>	<i>15</i>	<b>18</b>	<b>16</b>	<b>-3</b>
<i>K<sup>+1</sup></i>	<b>19</b>	<b>41</b>	<i>19</i>	<b>18</b>	<i>22</i>	<i>+1</i>
<i>S</i>	<i>16</i>	<b>35</b>	<i>16</i>	<b>18</b>	<i>19</i>	<b>-2</b>

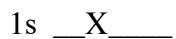
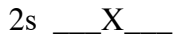
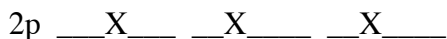
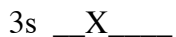
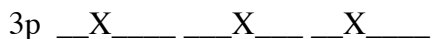
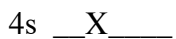
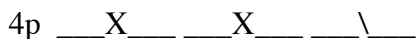
Configuration Section

1. Write the complete electron configuration for Chlorine.



2. How many electrons are in the outer shell of Chlorine? 7

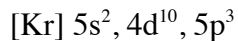
3. Fill the orbital diagram for Br. You can use circles or draw boxes.



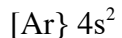
4. How many electrons are in the outer shell of Bromine?

7

5. Which element's configuration is shown below?



5. Write the noble gas configuration of Calcium.



6. Draw dot diagrams (valence shell only) for the following elements.



7. How many electrons are in all of the **p sublevels** of Ge? 14