

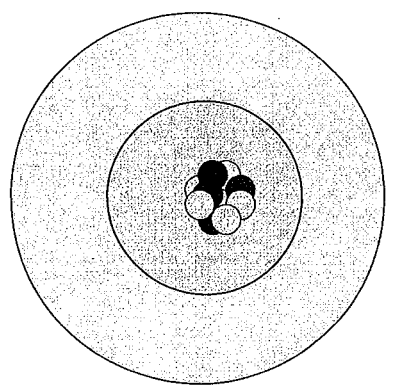
Biology 1
Atomic Structure Review - NOTES

What is an atom?
 An atom is the smallest part of a substance that still retains the properties of that substance.

Atomic Theory
 The atomic theory consists of these statements about atoms:

- o Elements are composed of atoms.
- o Atoms of the same element are alike.
- o Atoms are not changed by reactions, only rearranged to form new compounds
- o Atoms that are different have different properties (reactivity, mass)
- o A compound is defined by the number (proportion) and types to atoms in it.

What does an atom look like?
Current Model:-
 It is impossible to predict the exact location of an electron. They do not follow a set path in their orbit around the nucleus. The electron cloud is the region around the nucleus where you will likely find the electrons.



The Particles That Make Up Atoms

The Nucleus

Protons -
 Positively charged particles that have an atomic mass of 1AMU

Neutrons -
 Neutral particles that have an atomic mass of 1AMU

Outside the Nucleus
Electrons -
 Negatively charged particles that "orbit" the nucleus with high energy. These particles are very small and have almost no mass.

Atomic Number -

The atomic number is equal to the number of protons in an atom. The number of protons in an atom will determine the physical and chemical properties that a substance has.

Atomic Mass of an Atom -

The mass of an atom. It is found on the periodic table. This equals the number of particles in the nucleus.
 Atomic mass = Protons + Neutrons

Neural Atoms-

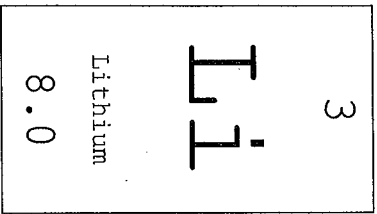
A neutral atom has no overall charge. A charge on an atom will result from the number of protons and electrons not being equal. In a neutral atom, the number of electrons will equal, and balance, the number of protons.

3
Li
Lithium
6.9

- Element Name: Lithium
- Element Symbol: Li
- Atomic Number = 3
- Atomic Mass = 6.9 (round to 7)
- Number of Protons = Atomic Number
- (3)
- Number of Neutrons = Atomic Mass - Atomic Number
- (7) - 3 = 4
- Number of Electrons = Need enough to balance protons
- (3)

Isotope -

Not every atom of a particular element is the same. Some are slightly larger and some slightly smaller. Remember, you cannot change the number of protons in an atom. Protons are an atom's identity. Therefore, if an atom is heavier or lighter than the average atom of the element, it must have more or less neutrons than normal. You can tell if an atom is an isotope by looking at the atomic mass of the atom. If this mass is larger than usual, then the atom has more neutrons than it normally does. If the mass is lower, the atom has fewer neutrons than normal.

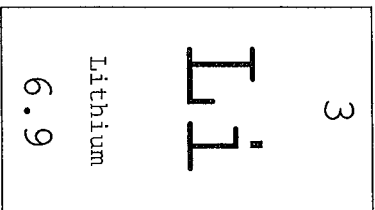


Element Name: Lithium
Element Symbol: Li
Atomic Number = 3
Atomic Mass = 8
Number of Protons =
Atomic Number
Number of Neutrons =
(3)
Atomic Mass - Atomic Number
8 - 3 = 5
Number of Electrons =
(3)
Need enough to balance protons

Ion -

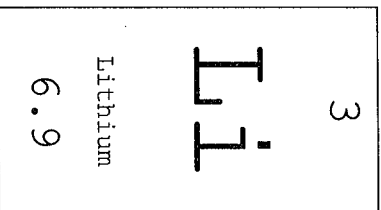
Sometimes, atoms have an electrical charge. This is the result of the protons and electrons not being present in equal numbers. Remember, you cannot change the number of protons in an atom. Protons are an atom's identity. Therefore, if an atom gains or loses electrons, the balance between positive and negative charges in the atoms will be disturbed. If an atom has more electrons than protons, it will have a negative charge. If an atom has more protons than electrons, it will have a positive charge.

+1 Ion



Element Name: Lithium
Element Symbol: Li
Atomic Number = 3
Atomic Mass = 6.9 (round to 7)
Number of Protons =
Atomic Number
Number of Neutrons =
(3)
Atomic Mass - Atomic Number
7 - 3 = 4
Number of Electrons =
(2)
Pay attention to charge!
+1 means that there is 1 more proton than electrons.
The number of electrons must be one less than the number of protons.

-2 Ion



Element Name: Lithium
Element Symbol: Li
Atomic Number = 3
Atomic Mass = 6.9 (round to 7)
Number of Protons =
Atomic Number
Number of Neutrons =
(3)
Atomic Mass - Atomic Number
7 - 3 = 4
Number of Electrons =
(5)
Pay attention to charge!
-2 means that there are 2 extra electrons. There should be 2 more electrons than protons.

SECTION 2-1 REVIEW

COMPOSITION OF MATTER

VOCABULARY REVIEW Define the following terms.

1. atom _____

2. neutron _____

3. compound _____

4. covalent bond _____

5. ion _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. The atomic number of carbon is 6. Therefore, the number of protons in a carbon atom equals
a. 3. b. 6. c. 7. d. 12.
- _____ 2. One of the kinds of particles found in the nucleus of an atom is the
a. proton. b. electron. c. ion. d. boron.
- _____ 3. The maximum number of electrons that can be held in the orbitals in an atom's second energy level is
a. 2. b. 4. c. 6. d. 8.
- _____ 4. Of the following elements, the one that is most likely to form ionic bonds is
a. hydrogen. b. carbon. c. sodium. d. oxygen.
- _____ 5. An example of a compound is
a. water. b. hydrogen gas. c. oxygen gas. d. chloride ion.

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SHORT ANSWER Answer the questions in the space provided.

1. What is the difference between mass and weight? _____

2. Identify the elements and the number of atoms of each element in each of the following compounds:

BO_2 _____ KCl _____

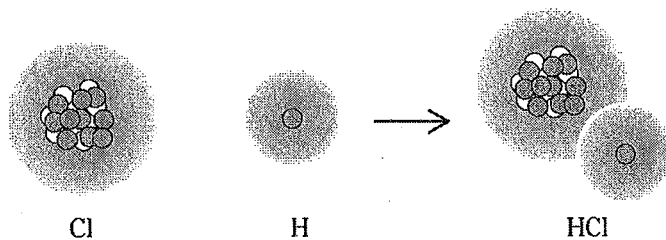
$\text{C}_6\text{H}_{12}\text{O}_6$ _____ NH_3 _____

3. How many pairs of electrons do the two oxygen atoms in an oxygen molecule share with each other? Explain your answer. _____

4. **Critical Thinking** The atomic number of argon is 18. Will argon tend to form bonds with other elements? Explain your answer. _____

STRUCTURES AND FUNCTIONS Use the figure to answer the following questions.

The diagram below shows bonding of a hydrogen atom with a chlorine atom. The atomic number of hydrogen is 1. The atomic number of chlorine is 17. The orbitals corresponding to the third energy level can hold up to 8 electrons.



1. What kind of bond is formed between hydrogen and chlorine atoms?

2. Describe the formation of this bond and the total number of electrons in the orbitals of each energy level.

Isotopes and Ions – Practice

Name:

Date:

Hour:

Determine if the elements in the pair are “isotopes” or “different elements.”

1. Element A has 2 protons and 3 neutrons.
Element B has 3 protons and 2 neutrons. _____
2. Element C has 2 protons and 3 neutrons.
Element D has 2 protons and 4 neutrons. _____
3. Element E has 71 protons and 71 neutrons.
Element F has 71 protons and 68 neutrons. _____
4. Element G has 65 protons and 61 neutrons.
Element H has 65 neutrons and 61 protons. _____
5. Element H has an atomic # of 15 and a mass of 30.
Element J has an atomic # of 15 and a mass of 31. _____
6. Element K has 8 protons and 8 neutrons.
Element L has an atomic # 8 and 8 neutrons. _____
7. Element M has an atomic # of 84 and a mass of 138.
Element N has 84 protons and 43 neutrons. _____

Conclusion:

In your own words, explain how you can tell if two atoms are isotopes or different elements.

Directions:

Fill in the missing information below.

Atom	Protons	Electrons	Charge
O	2	2	0
P	2		-1
Q	9		-4
R	12		+3
S	20		+2

Atom	Protons	Electrons	Charge
T	14	12	
U	98	89	
V	26	25	
W		45	-4
X		50	+6

Conclusion:

In your own words, explain how you determine the charge of an atom.

Neutral Atoms - Practice

Name: _____

Date: _____

Hour: _____

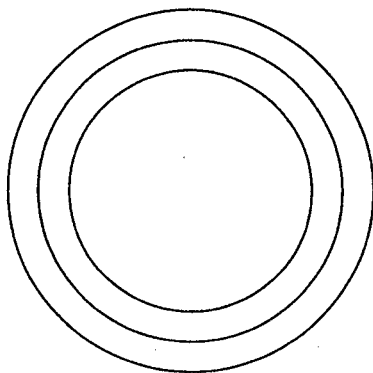
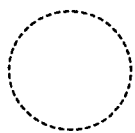
Directions:
Fill in the missing information in the chart below.

Element Symbol	Atomic #	Atomic Mass	Protons	Neutrons	Electrons	Element Symbol	Atomic #	Atomic Mass	Protons	Neutrons	Electrons
H							4				4
Li							6	12		6	6
F							7		7		7
Ne							16				16
Mg							43				43
K						Ca					
Sc							87	223	87	136	87
Co							92				
Ni							14	28	14	14	14
Ga											88
Br							104	261	104	157	104
Kr											94
Y							23	51	23	28	23
Mo						Ba					
Ag							56				56
Sn							40				40
I							9	19	9	10	9
Xe						Cl					

Atom Diagrams Practice

NAME:
DATE:
HOUR:

KEY:
Nucleus



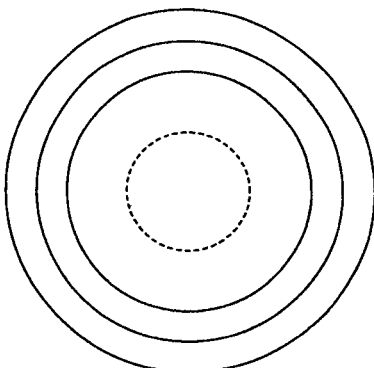
First Three Electron Orbitals

Protons Neutrons Electrons

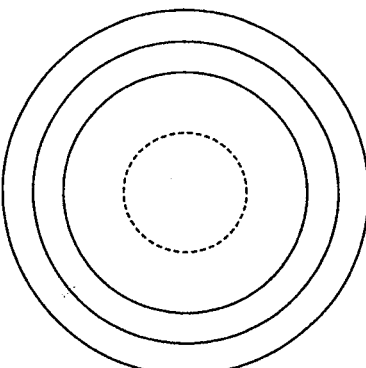
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INSTRUCTIONS:

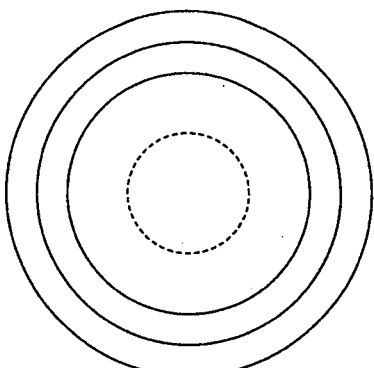
1. Use the periodic table to calculate the number of protons, neutrons and electrons in the given atom. Record this in the box next to each atom.
2. Draw the correct number of protons and neutrons in the nucleus.
3. Draw the correct number of electrons in each orbital.
NOTE: You may not use all three orbitals for each element. Remember the rule: 2-8-8.
4. Record the number of valence electrons in the space provided in the box next to the atom.



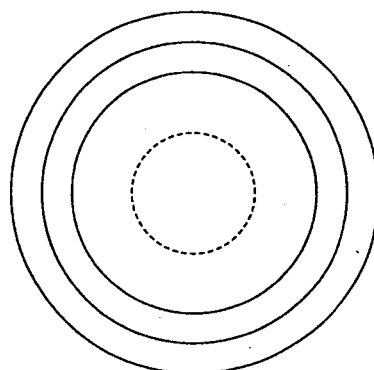
H
P=
N=
E=
VE=



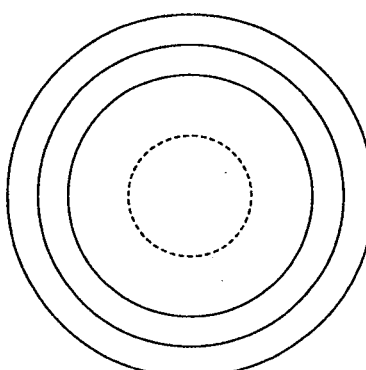
Na
P=
N=
E=
VE=



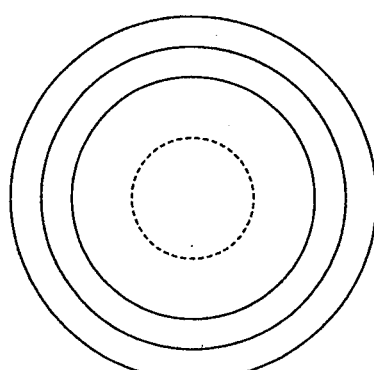
B
P=
N=
E=
VE=



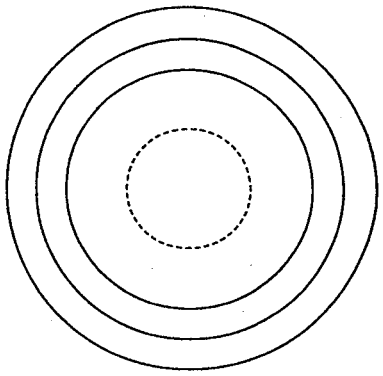
Si
P=
N=
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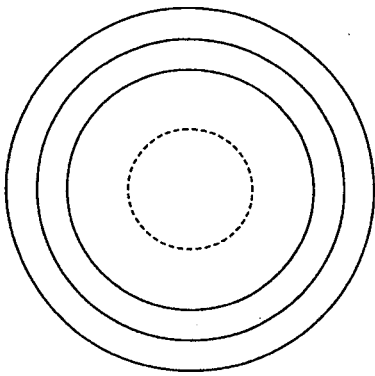
O
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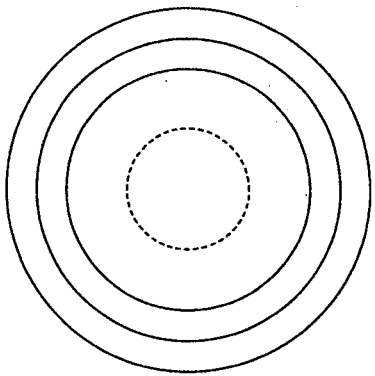
He
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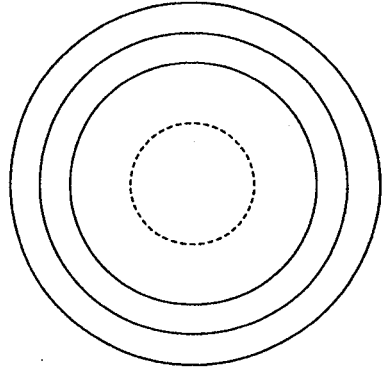
Cl
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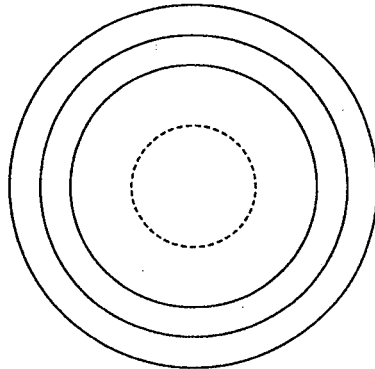
Mg
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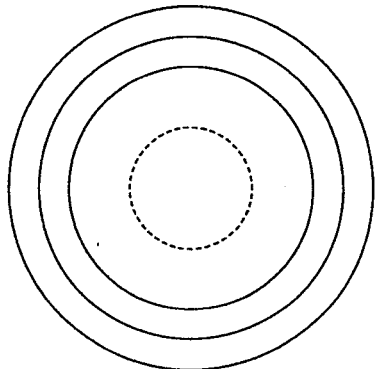
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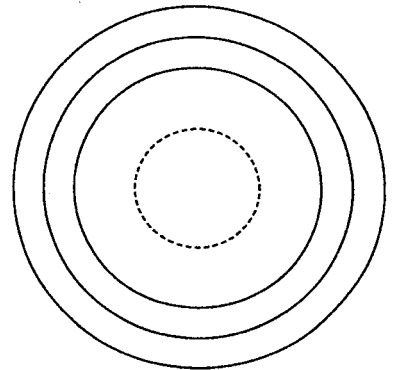
P
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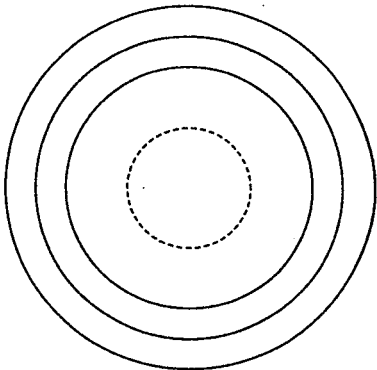
F
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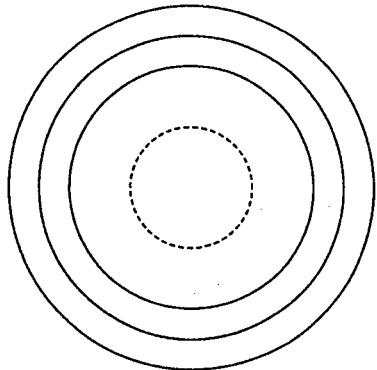
Li
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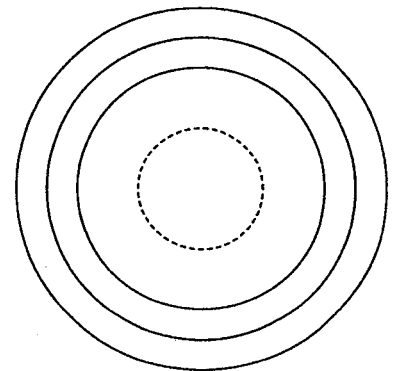
Ar
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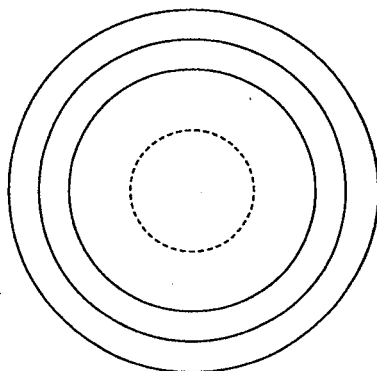
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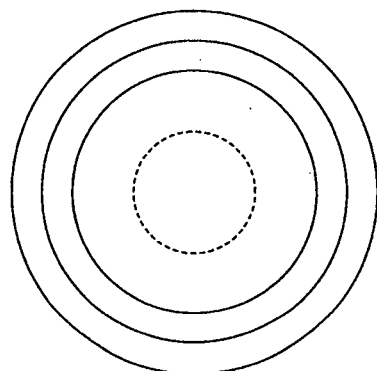
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