

HONORS BIOLOGY

CHAPTER 2 CHEMICAL BASIS OF LIFE

Name _____

Read 2.1 p. 18

Define: matter-

Define: element-

What are the rules for correctly writing a symbol?

Define: compound-

What are the four most abundant elements of life? _____

What are elements that are needed in the human body only in minute amounts? _____

Read 2.2 p. 19

Describe the purposes of the following elements:

Iodine	
Fluorine	
Iron	

Read 2.3 p. 20

Define: atom

Fill in the missing information about subatomic particles:

proton		
	No charge	
		Outside the nucleus

What represents the atomic number? _____

What represents the mass number? _____

How would you find the number of neutrons? _____

How do isotopes of an element differ? _____

What is a radioactive isotope?

Read 2.4 p. 21

KNOW: Living cells cannot distinguish between isotopes of the same element.

Fill in the following chart of commonly use radioisotopes and their uses/dangers:

C¹⁴ Radioactive carbon	
I¹³¹ Radioactive iodine	
PIB	
Radon	

Read 2.5 p. 22

It is the **electrons** that are directly involved in the chemical activity of an atom.

Fill in the facts about **electrons (e-)** in the chart below:

Move around the nucleus in energy levels called:	The outermost shell of e- is also called the _____ shell.
The volumes of space in which the electrons will be found are called:	If atoms do not have full valence shells, they will tend to :
Each orbital hold how many e-?	List 2 elements that have filled valence shells:
How many e- in one orbital? _____ How many orbitals are in each e- shell? 1 st _____ = _____ total e- 2 nd _____ = _____ total e- 3 rd _____ = _____ total e-	For 3 elements write how many e- are in their <u>valence shell</u> , and how many e- would be needed to fill the outermost shell? Na _____ valence e- /need _____ e- O _____ valence e- /need _____ e- Mg _____ valence e- /need _____ e-

What are **three** possible things electrons can do to form chemical bonds:

Share, _____

Looking at the periodic table on p. 22:

a. How many electrons and electron shells does a **fluorine atom** have? _____

b. How many electrons are in its valence shell? _____

c. How many electrons would fluorine need to add to have a filled valence shell? _____

Read 2.6 pp. 22-23

A. structural formula

E. molecular formula

I. polar covalent

B. valence

F. electronegativity

J. covalent

C. double

G. nonpolar covalent

D. space-filling model

H. molecule

MATCHING: Write the letter of the definition that best suits each term.

1. _____ Strongest kind of chemical bond
2. _____ An atom's attraction for shared electrons.
3. _____ Two or more atoms held together with a covalent bond form this.
4. _____ Bond in which electrons are shared equally between the atoms.
5. _____ The way these molecules are written: H₂, CH₄, H₂O

6. _____ The way these molecules are written: $\text{H} - \text{H}$, $\begin{array}{c} \text{H} \\ | \\ \text{H} - \text{C} - \text{H} \\ | \\ \text{H} \end{array}$, $\text{H} - \text{O} - \text{H}$

7. _____ The way these molecules are shown: , , 

8. _____ Bonding capacity of an atom.
9. _____ Type of bond consisting of two pairs, or 4 e⁻, (=)
10. _____ Unequal sharing of electrons produce this type of bond.

Read 2.7 p.24

1. Chlorine has how many valence electrons? _____
 Chlorine needs how many e⁻ to have a filled outer shell? _____
 Would chlorine gain or lose an e⁻ to fill that outer shell? _____
 How many protons (+) does a neutral chlorine atom have? _____
2. If chlorine had 17 e⁻ and now has 18 e⁻, what charge would it have (+) or (-) and number? _____
3. What do we call an atom with a charge (+) or (-)? _____
4. If Na⁺ and Cl⁻ formed a bond, what kind of bond would it be? _____
5. What is a synonym for an ionic compound? _____ (NOTE: the only salt is not NaCl)

Read 2.8 pp. 24-25

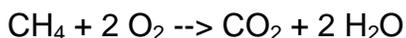
1. Sometimes there are weaker, temporary bonds that form between atoms. A **hydrogen bond** forms from the partial (+) or (-)? _____ end of the hydrogen atom and the partial (+) or (-)? _____ end of the other atom (mostly O, N, or F).
2. Sketch a water molecule with its hydrogen bonds with other water molecules (the correct number of water molecules) and the partial (+) and (-) ends.

Read 2.9 p. 25

1. An overarching theme in the chemistry of life: the structure of atoms and molecules determines the way they behave. We will learn because of water being polar covalent it has extraordinary properties to sustain life.

2. What does a chemical reaction show?

3. In the following chemical reaction, circle the reactants and put a rectangle around the products:



Notice that there are the same number of **C** on each side of the arrow, there are the same number of **O** on each side, and there are the same number of **H** on each side. This means the equation is **balanced**.

Read 2.10 -11 p. 26

Match the terms used to describe water:

A. temperature C. cohesion E. surface tension
B. heat D. adhesion F. evaporative cooling

1. _____ molecules of the same kind stick together (like water to water)
2. _____ molecules that are not the same stick to each other.
3. _____ amount of **total energy** associated with the movement of atoms/molecules in matter
4. _____ how difficult it is to break the surface of a liquid
5. _____ measures the average speed of molecules in matter
6. _____ as molecules leave the surface of a liquid they take heat with them

Read 2.12-13 p. 27

Why is water in the solid state less dense than in the liquid state? Sketch.

What advantage is it that water behaves this way to nature?

Define the following:

solution-

solvent-

solute-

aqueous solution-

Sketch how water molecules will arrange themselves to dissolve NaCl:

Read 2.14 p. 28

1. What two ions break off water when it goes into solution? _____
2. Which of these ions are broken off (donated) if the compound is an **acid**? _____
Which of these ions are broken off (donated) if the compound is a **base**? _____
3. What is the purpose of the **pH scale**?
4. How much more concentration is a pH of 2 than a pH of 4? _____
5. Identify the following: **SA**=strong acid **WA**=weak acid **N**=neutral,
SB=strong base **WB**=weak base
____ pH 7 ____ pH 13 ____ High number of H⁺ ____ pH 8
____ pH 1 ____ pH 6 ____ High number of OH⁻ ____ pH 14
____ Equal H⁺ / OH⁻
6. Define: **buffers**

Read 2.15 and 2.16 p. 29

1. Define: **acid precipitation** (include the 3 main pollutants contributing to its cause, and pH)
2. What was the purpose of the **Clean Air Act**?
3. How will **ocean acidification** alter the oceans?
4. Has water been detected on any other planet? How do you know?