AP Biology – Summer Assignment – Use Campbell CH 2-4

Biology is the study of life and living things. Before we can study and understand many biological principles, including the chemistry of all living things, it is necessary to understand some important chemical concepts. This assignment is designed to help you review some important skills and chemical concepts which you learned in chemistry. It is also designed as a reading guide for chapters 2-4 in your Campbell Biology textbook.

PART 1 – CHEMISTRY REVIEW

1) Complete the following conversions:

5.65 g = _____kg 0.056 m =_____mm 174 mL =_____L

711 kg =_____g 3.79 km =_____m 0.0062 L =_____µL

0.074 g =_____mg 745 µm =_____cm 127 µL =_____mL

302°C =_____K 185 K =_____°C 100°C =_____K

2) Express the following measurements in scientific notation:

246.983 =_____ 17.2 =_____ 0.00053 =_____

0.06713 =_____ 150.2 =_____ 100,005 =_____

132,987,000 =_____ 0.324 =_____ 0.00000000042=_____

3) Round each of these measurements to three significant figures:

24.590 =_____ 24.353 =_____ 3.002 =_____

956.789 =_____ 67.963 =_____ 102.06 =_____

102.6 = _____ 99.88 = _____ 763,829,041=_____

4) A block of rock salt has a mass of 10.7 g. Each edge of the block has a length of 5.00 cm. What is the **DENSITY** of the rock salt?

5) Indicate whether the substances below are **compounds** or **elements**:

SO_2:_____ S_8:_____ C_{60}:_____ CH_4:_____

He:_____ N_2:_____ NaCl:_____ H_2O:_____

6) What is an **ISOTOPE**?_____

7) What is the **OCTET RULE**? Explain its relationship to chemical bond formation.

8) Explain why atoms of the noble gases do not easily form bonds, unlike most other atoms.

9) Draw electron dot structures for the atoms of the following elements. (HINT: show the valence electrons)

Ca	**O**	**I**	**Al**
Xe	**Rb**	**N**	**C**

10) Complete the table below:

Isotope	**Symbol**	**# of protons**	**# of electrons**	**# of neutrons**	**Atomic #**	**Mass #**
carbon-12						
carbon-14						
tin-119						
tin-120						
iron-56						
lithium-7						
sodium-23						

11) **Balance** the following equations:

A) CH_4 + O_2 → CO_2 + H_2O

B) Sb + I_2 → SbI_3

C) H_2 + N_2 → NH_3

D) CO_2 + H_2O → $C_6H_{12}O_6$ + O_2

12) Determine the molar mass (g/mol) of the following compounds:

A) CO_2:_____ C) $C_6H_{12}O_6$:_____ E) H_2O:_____

B) NaCl:_____ D) H_2CO_3:_____ F) $C_{18}H_{38}$:_____

13) How many grams of lactic acid ($C_3H_6O_3$) are in 1 L of a 0.5 M solution of lactic acid?

14) How many grams of salt (NaCl) must be dissolved in water to make 2 liters of a 2.0 M salt solution?

15) Complete the following table of pH values of solutions: **NOTE: pH = -log[H^+]**

$[H^+]$	pH	Acidic, basic, or neutral?
1.00×10^{-7} M		
1.35×10^{-8} M		
8.23×10^{-2} M		
5.72×10^{-5} M		

16) Define the following terms which apply to solutions:

A) solute:_____

B) solvent:_____

C) aqueous solution:_____

D) hydrophilic:_____

E) hydrophobic:_____

17) Indicate whether the following compounds are **hydrophilic** or **hydrophobic**. Do these substances contain ionic, polar, or nonpolar bonds?

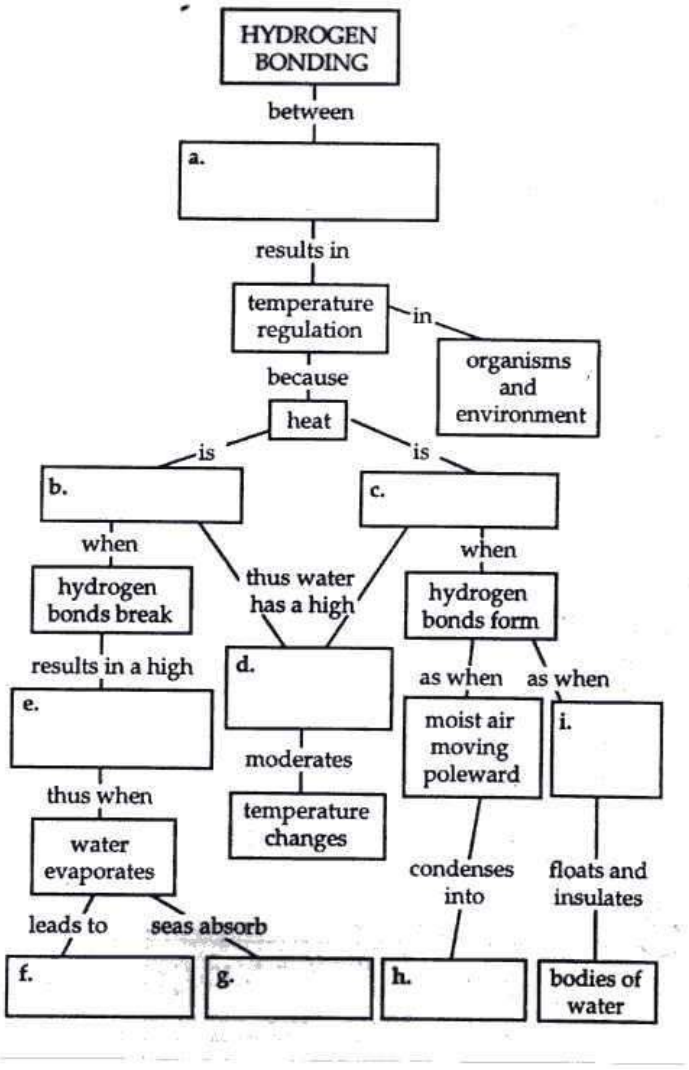
A) olive oil:_____

B) sugar:_____

C) salt:_____

D) candle wax:_____

18) Complete the following concept map illustrating how hydrogen bonding in water contributes to temperature regulation.



Campbell Chapter 2 - 3 – READING GUIDE – complete on a separate piece of paper and attach to this page!

1) Which four elements make up almost all of living matter?

2) Give the chemical symbols, atomic number, and atomic mass of each of these elements.

3. Which four elements account for most of the remaining percentage? (These total less than 4%)

4) What are trace elements? Name three trace elements.

5) What does the atomic number tell you about the atomic structure of any element?

6) Briefly describe each subatomic particle, its approximate weight (in a.m.u.)and charge.

7) How do you calculate the mass number of an atom?

8) How are radioactive isotopes useful in biological research?

9) Compared to ^{31}P, how does the radioactive isotope ^{32}P differ?

10) What are energy levels? Orbitals?

11) What is the relationship between electron energy and its distance from the nucleus?

12) How many electrons may occupy any single orbital?

13) What is a valence electron? What are the valences of each of the four most common elements? (the same 4 elements you listed on #1)

14) Explain the nature of a covalent bond.

15) Differentiate between polar and nonpolar covalent bonds. Give an example of each.

16) Describe the nature of ionic bonds.

17) Describe hydrogen bonds and how they form. Explain their significance to biological systems.

18) What is the significance of a molecule's shape?

19) Depict the hydrogen bond formed between:
    A) two water molecules
    B) a water molecule & an ammonia (NH_3) molecule

20) Describe the following properties of water and how each property is influenced by hydrogen bonding: cohesion, adhesion, surface tension, specific heat, evaporative cooling.

21) Draw the pH scale. Label the following regions: neutral, acidic, basic

22) Explain the following terms: acid, base, buffer

23) What is **ACID PRECIPITATION**?

Chapter 4: Carbon and Molecular Diversity – READING GUIDE

1) Define the following terms:

- organic chemistry:

- hydrocarbon:

- isomer:

- structural isomer:

- geometric isomer:

- functional groups:

2) How many **valence electrons** does one atom of carbon have?_____

3) How does carbon follow the octet rule?

4) List the four major elements that are components of organic molecules.

see reverse side for chart of functional groups!

5) Complete the following table for the six major functional groups of organic molecules.

Functional Group	Molecular Formula	Polar or nonpolar	soluble in water?	Names and Characteristics of Organic Compounds with this Functional Group	examples
Hydroxyl					
Carbonyl					
Carboxyl ***					
Amino ***					
Sulfhydryl					
Phosphate ***					