

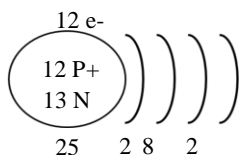
**Unit 1A: Biochemistry Study Guide**

1. Fill in the chart below to review the 4 biomolecules:

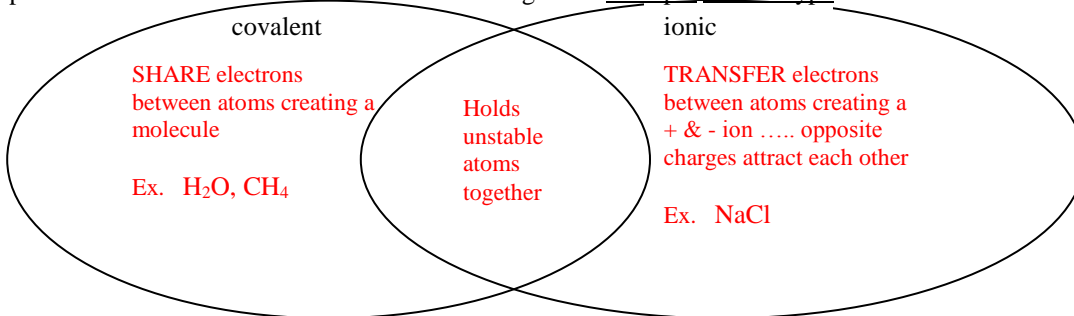
Polymer (Big Molecule)	Monomer (building block)	Function
Protein	Amino Acids	Stretchy Cell Building Material, muscle to move bones, speed up reactions, fight germs, carry O <sub>2</sub> , regulate blood sugar
Lipid	Glycerol and 3 Fatty Acids	Long-term energy storage, Cell membranes, Insulation, cell-to-cell communication, catch sunlight
Nucleic Acid	Nucleotide	Blueprint for life
Carbohydrate	Monosaccharide	Quick energy to cells

2. Write the biochemical reaction pattern for the following 2 common cellular reactions using the 3 terms provided (BIG molecule, BB, H<sub>2</sub>O)CONDENSATION: \_\_\_\_\_ BB \_\_\_\_\_ + \_\_\_\_\_ BB \_\_\_\_\_ → \_\_\_\_\_ BIG Molecule \_\_\_\_\_ + \_\_\_\_\_ H<sub>2</sub>O \_\_\_\_\_HYDROLYSIS: \_\_\_\_\_ BIG Molecule \_\_\_\_\_ + \_\_\_\_\_ H<sub>2</sub>O \_\_\_\_\_ → \_\_\_\_\_ BB \_\_\_\_\_ + \_\_\_\_\_ BB \_\_\_\_\_

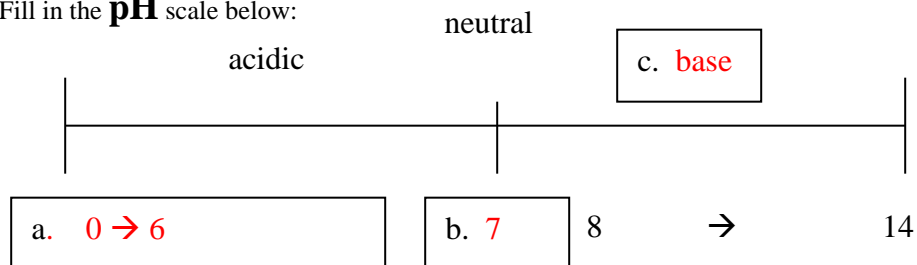
3. What 3 letters do most carbohydrates end with? \_\_\_\_\_ OSE \_\_\_\_\_

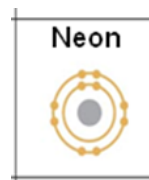
4. An atom of Magnesium has an atomic number of **12** and an atomic mass of **25**. Draw both the **Bohr** energy-level diagram and the **dot** diagram for this magnesium atom below.5. Is this atom of Magnesium a **stable & nonreactive** atom or a **reactive** atom likely to form chemical bonds ...Explain ?

Reactive ..... outer energy level is NOT filled with 8 electrons

6. Compare and contrast **covalent** and **ionic** bonds and give an example of each type

7. The weak attraction between the partial opposite charges of polar water molecules is known as: \_\_\_\_\_ Hydrogen bond \_\_\_\_\_

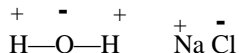
8. Fill in the **pH** scale below:



9. How many protons are in the nucleus for this neon atom 10 ?

10. Explain with an example from class what it means in chemistry if “**Like Dissolves Like**”

**Ex . Water dissolved salt ... things with electrical charges dissolve other things with charges**



11. Compare **cohesion** and **adhesion** of water and then explain an example of each that you observed in class.

**Cohesion:** H<sub>2</sub>O “sticks” to H<sub>2</sub>O .....42 drops of water held together on top of a penny

**Adhesion:** H<sub>2</sub>O “sticks” to other surfaces with electrical charges.... Water sticks to Mr. R’s skin

12. Match the chemical bond that is seen in the diagram(s) below.

<b>Chemical Bond Choices:</b>			
Ionic	Nonpolar Covalent	Polar Covalent	Hydrogen
<b>Hydrogen</b>	<b>Polar covalent</b>	<b>Nonpolar covalent</b>	<b>Ionic</b>

### Analogy Comparisons:

13. Kansas City : Chiefs :: Ray-Pec : panthers
14. monomer : polymer :: monosaccharide : polysaccharide
15. sharing electrons : covalent :: Transfer electrons : ionic bond
16. proton : positive :: Neutron : neutral
17. RNA : Nucleic Acid :: cholesterol & hormones : Lipid
18. polysaccharide : carbohydrate :: polypeptide : protein
19. Insulin & antibodies : protein :: glycogen : carbohydrate
20. starch : plants :: glycogen : animals
21. water : polar :: lipid : nonpolar
22. weak acid : pH 6 :: weak base : pH 8- 10
23. break down polymer : hydrolysis :: build polymer : condensation
24. Match the following carbohydrates to the appropriate place in the table below:

Carbohydrate Molecules:							
lactose	starch	glycogen	sucrose	glucose	cellulose	fructose	chitin

Monosaccharides	Disaccharides	Polysaccharides
glucose	sucrose	starch
fructose	lactose	glycogen
		cellulose
		chitin

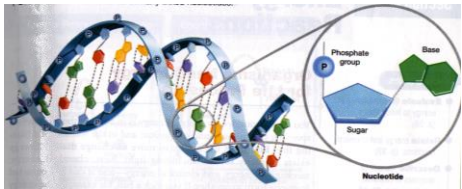
25. Match the following molecule examples to the appropriate biomolecule group with a check mark.

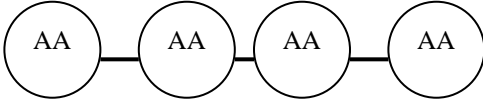
Molecule Examples	Carbohydrate	Lipid	Nucleic Acid	Protein
1. starch	X			
2. enzyme				X
3. oil		X		
4. steroid hormone		X		
5. glucose	X			
6. Glycerol		X		
7. glycogen	X			
8. DNA			X	
9. cellulose	X			
10. muscle				X
11. plant pigments		X		
12. hemoglobin				X
13. gluten				X


LABEL each biomolecule diagram:

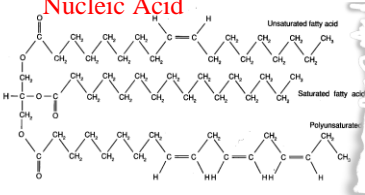
Carbohydrate	Protein	Water	
Lipid	Nucleic Acid		

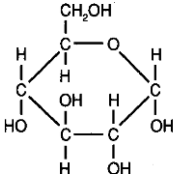
  


26. 

27.  Protein

28.  Carbohydrate

29.  Lipid

30.  Carbohydrate

31.  Water

### 32. McMush Lab: Recap

Biomolecule Tested	Chemical Indicator Used	+ result color change	+ control (positive)	-Control (negative)	McMush Results Yes or No
glucose	Benedicts	orange	glucose solution	water	Yes
Protein	Biuret Reagent	dark purple	egg white protein	water	Yes
starch	Iodine	black	starch solution	water	Yes

33. What is the purpose for having a **positive** control in a lab experiment like the McMush Lab?

- To see what a positive indicator color looks like for comparison
- To verify that all the chemicals added and color-changing indicator chemicals are working properly

34. What is the purpose for having a **negative** control in a lab experiment like the McMush Lab?

- To see what a negative indicator color looks like for comparison
- To verify there are no unexpected contaminants in the lab materials

35. Which of the following are likely reasons why the negative control test tube (#1) at the glucose lab station suddenly started giving all students in 4<sup>th</sup> period a **positive result** (turned orange) when results from all students in the previous 3 periods had been negative for glucose?
- the Benedict's solution expired and quit working
  - the hot water bath was too cool
  - the saliva enzymes donated fresh for 4<sup>th</sup> period were contaminated with glucose**
  - someone spilled glucose into the hot water bath water at the end of period 3
  - someone spilled glucose into the Benedict's solution at the end of period 3**
  - someone didn't clean a test tube properly at the end of period 3 and left some glucose in it.
  - the saliva enzymes donated fresh for 4<sup>th</sup> period didn't work correctly

36. Match the following molecule FUNCTIONS to the appropriate biomolecule group with a check mark.

Molecule FUNCTIONS	Carbohydrate	Lipid	Nucleic Acid	Protein
1. creates a "spiderweb" to begin blood clotting				X
2. dense, long-term energy storage / insulation in animals		X		
3. stores genetic instructions			X	
4. used to build cholesterol and hormones		X		
5. used to build muscle tissue for movement				X
6. captures sunlight energy		X		
7. contains quick-burning energy storage for cell use	X			
8. carries oxygen through the blood for cell use				X
9. labels germs for destruction by the immune system				X
10. used to build a protective wall around plant cells	X			
11. used to build hair, fingernails, tendons, ligaments				X
12. used to build a protective exoskeleton for insects	X			
13. used to build cell membranes		X		
14. used to store energy in muscles for exercise	X			

37. Which of the following lists contains ONLY proteins?

- hemoglobin, cholesterol, antibodies, muscles
- muscle, insulin, glycogen, hemoglobin
- antibodies, muscles, insulin, collagen**
- collagen, insulin, hemoglobin, glycerol

38. Which of the following lists contains ONLY lipids?

- cholesterol, chlorophyll, estrogen, fat**
- fat, cholesterol, starch, wax
- estrogen, collagen, chlorophyll, insulin
- glycogen, oil, fat, cholesterol

39. Which of the following lists does NOT contain a polysaccharide?

- glucose, starch, chitin
- sucrose, glucose, collagen**
- glycogen, cellulose, glucose
- insulin, sucrose, cellulose