



The Science Academy STEM Magnet

## AP Biology Summer Assignment 2022-23

### Welcome to AP Biology!

The two main goals of AP Biology are to help you develop a conceptual framework for modern biology and to gain a deeper appreciation of science as a process (as opposed to an accumulation of facts). Because of the rapid pace of discovery in the life sciences our primary emphasis is on developing an understanding of unifying concepts that connect the major topics of biology. The AP Biology Curriculum centers around the four Big Ideas and you will need to not only know these but also understand how they all relate:

- **Big Idea 1: The process of evolution drives the diversity and unity of life.**
- **Big Idea 2: Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis.**
- **Big Idea 3: Living systems store, retrieve, transmit and respond to information essential to life processes.**
- **Big Idea 4: Biological systems interact, and these systems and their interactions possess complex properties.**

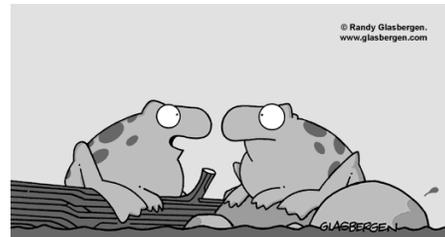
### What to do before the first day of school:

In order to cover ALL of the material, you are responsible for reviewing the Chemistry section on your own. Here is what you need to do:

- Watch the following two YouTube videos. One of them is part of Crash Course with Hank Green. The other is part of Bozeman science, a series of videos that covers all AP Bio topics. Get to know them as we will tune into Crash Course and Bozeman AP Bio quite a bit during the year. These two videos are great chemistry reviews.  
[https://www.youtube.com/watch?v=HVT3Y3\\_gHGg&list=PL6C159EF1A62143A2&index=11](https://www.youtube.com/watch?v=HVT3Y3_gHGg&list=PL6C159EF1A62143A2&index=11)  
<https://www.youtube.com/watch?v=XeuyC55LqiY>
- Watch the following TED Ed videos about how the polarity of water influences its behavior and pH.  
<https://www.youtube.com/watch?v=ASLUY2U1M-8>  
<https://www.youtube.com/watch?v=DupXDD87oHc>
- **Complete the Summer Homework.** As an AP Biology student, the expectation is that if you don't know it, find it out!! Use all of your resources!!!

**The summer homework is due on the first day of school.**

I am looking forward to working with you next year! Don't procrastinate on this assignment but don't let it keep you from having a wonderful summer!!!

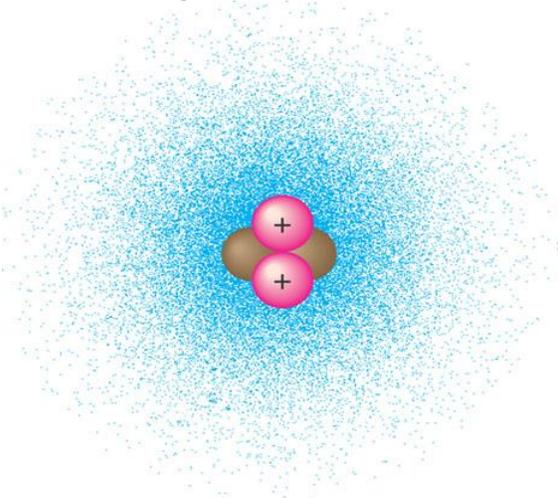


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"Looks aren't everything. It's what's inside you that really matters. A biology teacher told me that."

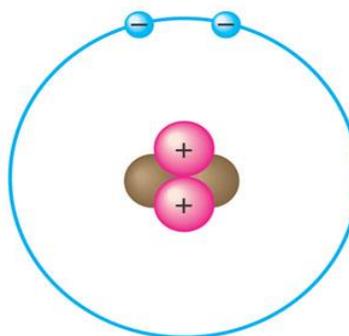
### AP Biology Essential Chemistry

This is a review of basic chemistry – we will not spend any class time on these concepts as they should have been learned in chemistry. Please make sure that you know them and if not, be sure to study through them. Please put this all in your AP Biology three ring (1 ½ or 2 in.) binder!

1. Contrast the term element with compound.
2. Know the symbols of the following elements and their charge:
  - a. Carbon
  - b. Hydrogen
  - c. Oxygen
  - d. Nitrogen
  - e. Phosphorus
  - f. Sulfur
3. Label the diagram below and define the terms that you label.



(a)



(b)

4. Contrast the terms atomic mass and atomic number.
5. What is the difference between the terms atomic mass and atomic weight?



f. Water (you would be surprised at how many people missed this!!!)

11. How do ionic bonds compare with covalent bonds?

12. Compare and contrast hydrogen bonds and van der Waals interactions.

13. Define a dynamic chemical equilibrium in terms of quantities of reactants and products. This is a critical concept!

14. Why is water considered a polar molecule?

15. For each of the below listed properties of water – briefly define the property and then explain how water's polar nature and polar covalent bonds contribute to the water special property.

a. Cohesion

b. Adhesion

c. Surface tension

d. High specific heat

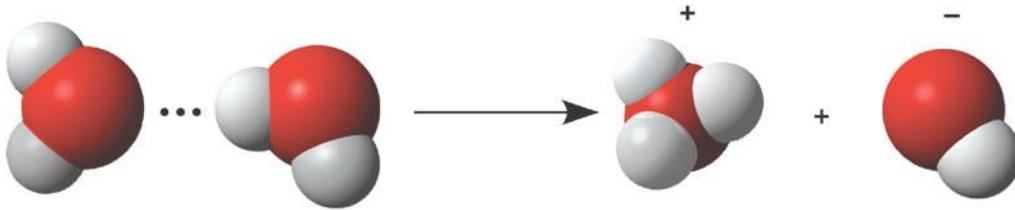
e. Heat of vaporization

f. Evaporative cooling

16. What is special about water and density?

17. Explain how these properties of water are related to the phenomena described in the statements below. More than one property may be used to explain a given phenomenon.
- During the winter, air temperatures in the northern United States can remain below  $0^{\circ}\text{C}$  for months; however, the fish and other animals living in the lakes survive.
  - Many substances—for example, salt ( $\text{NaCl}$ ) and sucrose—dissolve quickly in water.
  - When you pour water into a 25-ml graduated cylinder, a meniscus forms at the top of the water column.
  - Sweating and the evaporation of sweat from the body surface help reduce a human's body temperature.
  - Water drops that fall on a surface tend to form rounded drops or beads.
  - Water drops that fall on your car tend to bead or round up more after you polish (or wax) the car than before you polished it.
  - If you touch the edge of a paper towel to a drop of colored water, the water will move up into (or be absorbed by) the towel.
18. Define the following terms:
- Solute
  - Solvent
  - Aqueous solution
  - Hydrophilic
  - Hydrophobic

19. Label the diagram below to demonstrate the dissociation of the water molecule and then relate this diagram to the term pH.



20. What defines an acid and a base?

21. Why are small changes in pH so important in biology? Give one example.

22. What is a buffer? Give an example on how they would work in a living organism.