





9. Differentiate: invalid hypothesis vs falsified hypothesis.

10. List the 4 elements make up > 95% of living organisms.

11. Explain how table salt has emergent properties.

12. Recall atomic structure, including proton, neutron, electron, mass number and orbital. Describe what is meant by electrons in an "excited state" vs those in a "ground state", in terms of energy.

13. Define: isotope. Explain two important physical properties of radioactive isotopes that make them useful in biological research.

14. Compare/contrast: C-12 and C-14.

15. Recall- ionic bond. **Given**:  $\text{CaSO}_4$ .

A- State which is the cation and which is the anion.

B- Describe why this bond is ionic, rather than covalent, in terms of electronegativity.

C- Would this substance disassociate in water? \_\_\_\_\_ If so, explain WHY and indicate how many 'particles' it would dissociate into.

D- If glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) was the solute, would it disassociate in water? Explain (and include if disassociation means the same as solubility).

16. Does a valence  $e^-$  in Carbon have higher or lower chemical (potential) bond energy than a valence  $e^-$  of Sulfur?
17. Distinguish between a polar and nonpolar covalent bond. BE SPECIFIC! Give an example of each.
18. Diagram 2 water molecules and indicate the Hydrogen bond(s) using labeled dashed lines.
19. Give an example of any BIOLOGICAL (organic) molecule that forms H bonds with water.  
Diagram your example, showing the positive and negative attractions, as were done above.  
Predict at least one 'consequence' if the bond was either covalent or ionic.
20. Does a chemical reaction in dynamic equilibrium mean that the concentration of reactants and products is equal? Explain.

21. A- Define what is meant by pH.

B- Describe how the pH scale works (in terms of H<sup>+</sup> and OH<sup>-</sup> concentrations)

C- Explain how buffers resist changes in pH (refer to carbonic acid/bicarbonate for an example)

22. Water is essential for life on earth.

A- List at least 5 properties of water.

B- Explain why water is a good solvent (include the terms polar and hydrophilic)

C- Explain how the high surface tension of water affects evaporation.

D- Compare & contrast cohesion and adhesion. Give an example of each as it relates to a living organism (ex- root uptake of a tree)

E- Explain water in terms of specific heat. Compare with a substance that has a 'contrasting' specific heat, such as a metal.

23. A- Describe an example of how acid precipitation affects life on earth.

B- CO<sub>2</sub> is the main product of fossil fuel combustion. Although the majority stays in the atmosphere, contributing to the greenhouse effect, about 30% is absorbed in the oceans. Explain what happens when CO<sub>2</sub> dissolves in seawater.

24. \*Review: Molarity/Concentration from chemistry. You must apply the formula  $C_1V_1 = C_2V_2$  (or  $M_1V_1 = M_2V_2$ ). \*Refer to *AP Bio Formula Sheet*. Given: Your teacher tells you to prepare 0.5L of [1X] TAE solution for an electrophoresis experiment, but s/he gives you a bottle of [50X] TAE. Describe the procedure for doing this (\*include showing your work, using the equation).

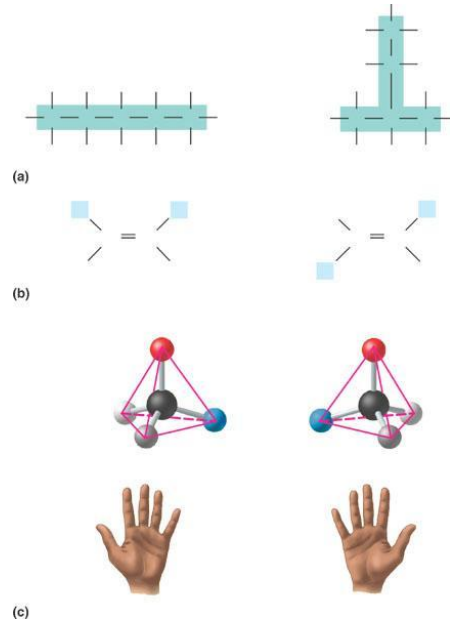
25. Why is organic chemistry so important in the study of biology?

26. Why was the Urey-Miller experiment significant?

26. What is unique about carbon that makes it the central atom in the chemistry of life?



27. Use the diagram below & label the three types of isomers. *Both examples from (c) are the same type*



28. Be very familiar with the following functional groups, as their properties are most important in the processes of life. Create a table (either *below*, or *on the back of this page* or *on a separate sheet*). After each functional group, draw the structure, name the compound, state an example & note the functional properties of each

a. Hydroxyl

b. Carbonyl- aldehyde

c. Carbonyl- ketone

d. Carboxyl

e. Amino

f. Sulfhydryl

g- Methyl

h. Phosphate

\*There are 2 other concepts we will go over in class that are not in this handout and were not addressed in Mag or Hon Bio (but absolutely WILL BE on the AP Exam). Get a head start & look these up. Be prepared to share in class:

1) Positive Control vs Negative Control

2) Null Hypothesis vs Alternative Hypothesis