

Chapter Two Study Guide
Chemical Level of Organization / Tortora & Derrickson

1. What is an element? What is an atom?
2. Review the "Periodic Table of Elements". There is an example of a Periodic Table of Elements in your textbook (see Appendix B). I have also included several different versions of the Periodic Tables in Chapter Two Web Resources. There are also several examples of the Periodic Table of Elements on display in the hallway on the 2nd floor of J-Building. What is the difference between the atomic number and the atomic mass number? What does it tell you about the atom?
3. How many different elements account for 98.5% of the human body?
4. What atom is the "key" building block for life?
5. What are the "particles" that make up an atom? Their characteristics?
6. How are the particles of an atom arranged?
7. How many electrons are in the first electron shell? How many electrons are in all subsequent shells? What do we call the electrons in the outer orbit?
8. What is an isotope?
9. What is the difference between Carbon 12 and Carbon 14?
10. Why can we use C14 to "measure time"?
11. What is an ion? What is ionization?
12. What do we call an atom that loses electrons?
13. What do we call an atom that gains an electron?
14. What is a "hydration shell"?
15. Is the term ion(s) always associated with a single element?
16. What are electrolytes? When your heart contracts, it generates a change in voltage (electricity). Why can we use this "event" to measure cardiac function?
17. What is a free radical? (Use oxygen to answer this question) Where may free radicals come from? Are they dangerous? What can they do once inside your cells?
18. How do "antioxidants" protect us from free radicals?
19. What is a "common" antioxidant that you might consume in a breakfast drink?
20. What is a molecule?
21. Why are glucose and fructose isomers?
22. What is the relationship between a compound's molecular weight and its Atomic Mass Units (amu)?
23. What holds molecules together?
24. What is the difference between an ionic, covalent, polar covalent, and hydrogen bond?
25. What is a mixture?
26. How are mixtures classified? Give examples of the three "types" and distinguish them based on solute size, appearance, effect of gravity on solute, and ability of the solute to pass through a semi permeable membrane.
27. What type of bond holds water together?
28. What are six important properties of water? (solvency, cohesion, adhesion, chemical reactivity, and thermal stability)

29. What do we call substances that readily dissolve in water? Give an example (hydrophilic) What do we call substances that do not readily dissolve in water? Give an example (hydrophobic)
30. Compared to non-polar molecules, water can absorb a lot of heat (calories) without a large change in temperature. Heat is a function of the relative movement of the molecules and water's hydrogen bonds resist molecular movement even as the water absorbs heat. In this context, water also plays an important role when it evaporates off of our skin. What is the net effect when water evaporates off of our skin? (one milliliter of perspiration evaporating = loss of 500 cal of heat) Do you think it is a good idea to wipe perspiration from your skin after vigorous exercise? Why or why not?
31. What do solutions of different compounds but equal Molarity have in common?
32. How do solutions of different compounds and but equal Molarity differ?
33. What does Avogadro's number tell us about a mole of any compound?
34. What is an acid? Give an example and explain why it is an acid:
35. What is a base? Give an example and explain why it is a base:
36. As you know, when you look at a glass of pure water, it is a mixture of H₂O molecules with H⁺ and OH⁻ ions. Why is pure water not an acid or a base?
37. What is the pH scale? Site examples of household items that are either on the acid or basic side of this scale.
38. What is a buffer?
39. What is energy?
40. What is the difference between potential and kinetic energy? Is heat potential or kinetic energy? Explain.

41. One of the most fundamental chemical reaction in human physiology is CO₂ + H₂O -----> H₂CO₃ -----> HCO₃(negative charge) + H(positive charge).

Please memorize this formula and the name of the compounds (carbon dioxide + water forms carbonic acid which dissociates into bicarbonate ion plus a hydrogen ion). You will see this formula repeatedly used by cells of many different organ systems. It explains how your stomach makes acid, how oxygen dissociates from hemoglobin, and how acid is "excreted" by our respiratory system.

What is the "law of mass action" and how does the "law of mass action" "move" this chemical equation?

42. What is a catalyst? Biocatalyst?
43. What is oxidation? What is reduction? How do these terms relate to catabolism and anabolism?
44. What can we tell by comparing the relative number of carbons, oxygens, and hydrogen atoms in a molecule?
45. Organic chemistry is the study of the compound carbon. Biochemistry is the chemistry of our cells. You need to be able to identify the chemical structure of the follow compounds: carbohydrates, lipids (fat), proteins, and nucleic acids. These compounds are constructed from subunits called "monomers" which form "polymers". For example, a proteins (a polymer) is constructed of amino acids (a monomer). (See "Know Your Molecules" PowerPt posted on Web site)

46. How do lipids react in water?
47. How do phospholipids react in water? The yolk of an egg contains the phospholipid lecithin. When you bake a cake, why do we add the yolk of an egg to the batter?
48. What are proteoglycans? Where are they in our body? How are the “parts” held together?
49. What is a gel state?
50. What happens to a protein when it is denatured?
51. How can we denature proteins?
52. What is an enzyme?
53. What is ATP? Explain its function.
54. What are nucleic acids? How are they used in our body?
55. What are the four primary macromolecules?
56. What are the monomers of the four primary macromolecules?

Hot Questions

1-2-5-6-7-8-11-12-13-15-17-20-21-23-24-25-27-29-34-35-36-37-38-41-42-43-45-46-48-49-50-51-52-53-54