



READ: Chapter 2, pages 15-23 and complete the Chemistry Review exercises before class.

CHEMISTRY OF LIFE

DO: Chemistry Review Exercises

1. Define Matter:

2. How do the elements relate to matter?

3. Define atom:

4. Name the three basic parts of an atom. Give the location and charge of each part in the atom.

| Particle | Location | Charge |
|----------|----------|--------|
| | | |
| | | |
| | | |

5. For an atom to have no overall (net) charge, it must possess an equal number of _____ and _____.

6. If an atom has one more proton than electrons, its overall (net) charge is _____.

7. If an atom has an overall (net) charge of -1, it must have one more _____ than _____.

8. If an atom has two more electrons than protons, its net charge is _____.

9. The atomic number is equal to the number of _____.

10. _____ + _____ equals the atomic mass (weight).

11. Define Isotope:

12. Give an example of how isotopes are useful.

13. Define molecule:

14. Define compound:

15. If the molecular weight (aka., formula weight) of a molecule is the sum of the atomic weights and the chemical formula reveals the number and types of atoms in a molecule, what are the molecular weights of the following molecules? Given the atomic weights are: O = 16 g/mol, C = 12 g/mol.

MW of O₂ =

MW of CO =

MW of CO₂ =

16. Which of the three molecules above is not a compound?

17. In the space below, list the bonds that hold atoms together to form molecules and describe the forces that attract and bind the nuclei of atoms together to form molecules.

| Bond Type | Forces that bind atoms |
|-----------|------------------------|
| | |
| | |

18. Which of the two bonds above are the strongest?

19. If NaCl (table salt) molecules are held together by ionic bonds, what happens to the salt molecules when dissolved in water? Why?

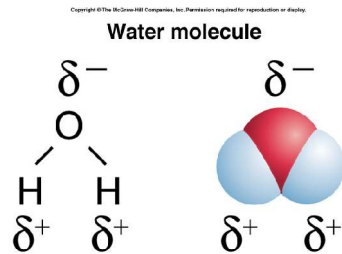
20. If the atoms of CO₂ are bonded by covalent bonds, what is the state of the dissolved CO₂ molecule in water? Why?

21. Listed below are other molecules that we will encounter during the semester. Fill in the table below to learn about their molecular structure and behavior in water (the biological solvent). Hint: some ions are compound ions. The atoms of compound ions are covalently bound together and possess a charge that allows them for ionic bonds with oppositely charged ions. Examples: bicarbonate (HCO₃⁻) and sulfate (SO₄⁻²).

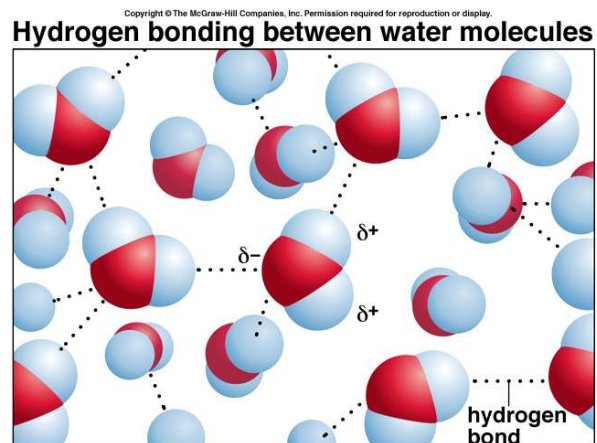
| Molecule | Type of Bond | State in Water |
|----------------------------------------------------------------------|--------------------|-------------------------------------------------|
| Potassium chloride (KCl) | | K ⁺ + Cl ⁻ |
| Glucose (C ₆ H ₁₂ O ₆) | covalent | |
| Sodium bicarbonate (NaHCO ₃) | | Na ⁺ + HCO ₃ ⁻ |
| Ethanol (C ₂ H ₅ OH) | | C ₂ H ₅ OH |
| Magnesium sulfate (MgSO ₄) | ionic and covalent | |
| Carbon monoxide (CO) | covalent | |
| Curare (curarine) (C ₁₉ H ₂₆ N ₂ O) | | |

| | | |
|------------------------------------------------------------------------------------------|----------|--|
| Calcium chloride (CaCl ₂) | | |
| Creatine (NH ₂ C(:NH)N(CH ₃)CH ₂ CO ₂ H) | covalent | |
| Glycine (amino acid) NH ₂ CH ₂ CO ₂ H | covalent | |

A. Water



B. Water Forms Hydrogen Bonds (H-bonds)

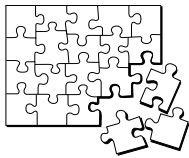


C. Properties of Water

D. Acid - Base Chemistry

Definitions

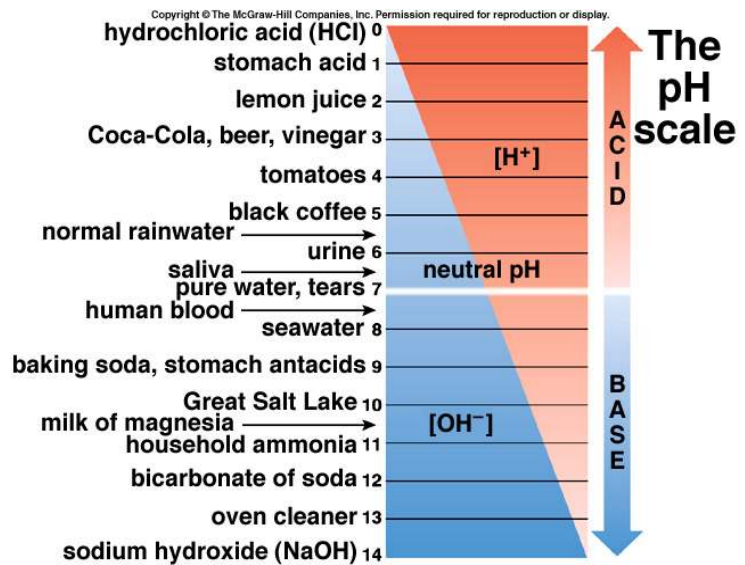
1. Acid -
2. Base -
3. Buffer -



Use the pH scale at right to answer the following questions (circle your answers):

The pH of a strong acid is:
high / low

The concentration of H⁺ of a base is: high / low

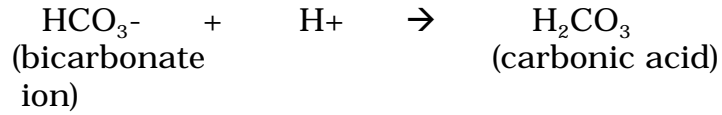


When a person has an ulcer, foods that are acidic irritate the ulcer. Which of the following should a person suffering from an ulcer avoid?

Lemons / laxatives (milk of magnesia) / beer / pickles / coffee

6. The Bicarbonate ion (HCO_3^-) buffer system

e.g., buffering added acid:



e.g., buffering added base:

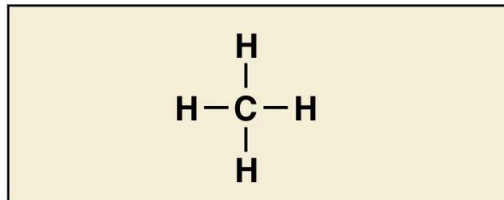


E. Carbon (Organic) Chemistry

1. Atomic number = 6, forms 4 covalent bonds. Atomic Mass = _____

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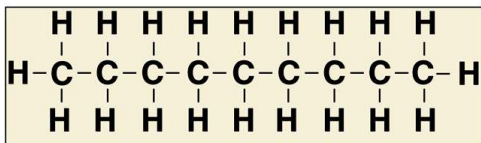
Carbon atom



2. Carbon atoms form many different complex molecules.

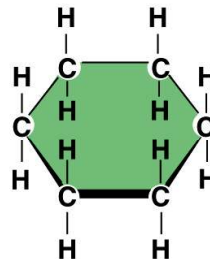
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Hydrocarbon chain

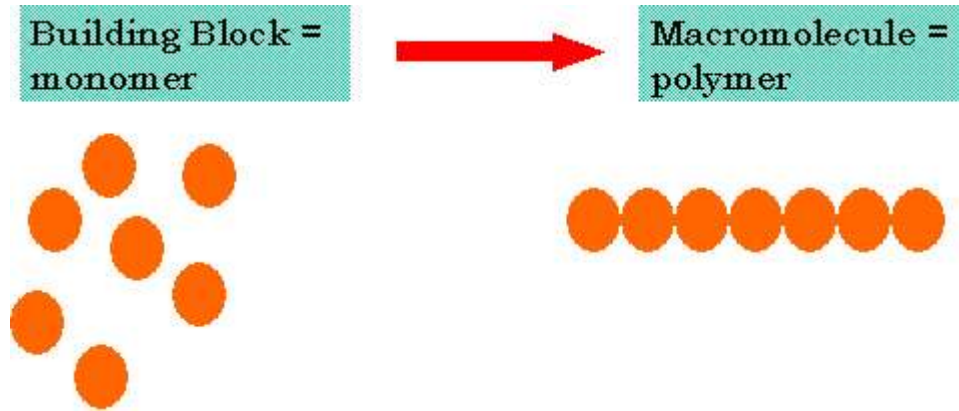


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Ring Compound



3. Small “building block molecules polymerize into MACROMOLECULES.



F. Categories of Macromolecules.

Macromolecules -

| Category | Common Name(s) | Components | Functions |
|----------|----------------|------------|-----------|
| | | | |
| | | | |
| | | | |
| | | | |

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