



The great diversity of carbon compounds makes carbon a natural element on which to base complicated LIVING SYSTEMS

UNIQUE MOLECULES CAN BE FOUND TO CODE EVERY BIOCHEMICAL PROCESS

## WHY CARBON?

Why is carbon the chosen element on which to base living systems?

### 1.2 BONDING PROPERTIES OF CARBON

1. Carbon FORMS COVALENT BONDS

2. Carbon FORMS BONDS WITH ITSELF

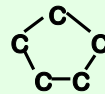
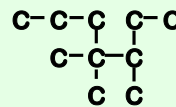


### 1.2 BONDING PROPERTIES OF CARBON (continued)

Carbon is one of the few elements that can form chains



Carbon can also form BRANCHED NETWORKS and RINGS

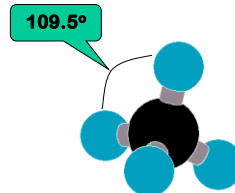


### 1.2 BONDING PROPERTIES OF CARBON (continued)

3. Carbon IS TETRAVALENT  
(4 SINGLE covalent bonds)



### The tetrahedral shape of carbon



A carbon with 4 single bonds is known as:  $sp^3$

## 1.2 BONDING PROPERTIES OF CARBON (continued)

Carbon IS **TETRAVALENT**  
(2 SINGLE & 1 DOUBLE covalent bond)



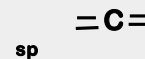
Trigonal planar with a bond angle of  $120^\circ$

## 1.2 BONDING PROPERTIES OF CARBON (continued)

Carbon IS **TETRAVALENT**  
(1 SINGLE & 1 TRIPLE covalent bond)



Carbon IS **TETRAVALENT**  
(2 DOUBLE covalent bonds)

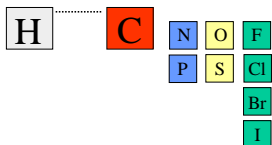


Linear with a bond angle of  $180^\circ$

## UNIQUE PROPERTIES OF CARBON (continued)

## 4. COVALENTLY BONDS WITH A FEW OTHER COMMON ELEMENTS

(H N O P S F Cl Br I)



*How many covalent bonds are formed with these atoms?*

## UNIQUE PROPERTIES OF CARBON (continued)

SUMMARY

1. Carbon forms covalent bonds
2. Carbon bonds to itself
3. Carbon forms 4 bonds (tetraivalent)
4. Bonds are single, double or triple
5. Carbon bonds to other elements

## GENERAL CHEMISTRY TOPICS THAT APPLY TO ORGANIC CHEMISTRY

Lewis structures (covalent compounds)VSEPR (covalent compounds)

- Shapes
- Bond angles

Polarity of Organic Molecules

- electronegativity of bonded atoms
- shape and symmetry of polar bonds

Intermolecular forces

- London forces
- Dipole-dipole
- H-bonding

Acids and bases (pH)

ORGANIC	INORGANIC
Liquid	solid
Low melting/boiling pt	High melting/boiling pt
Non-polar	Polar
Volatile	Non-volatile
Flammable	Non-flammable
Low water solubility	High water solubility
Non-electrolyte (molecular in water)	Electrolyte (ionic in water)

### STUDY OF ORGANIC CHEMISTRY

- Learn elements involved
- Learn bonding
- Write molecular formulas
- Write structural formulas from molecular formulas

### STUDY OF ORGANIC CHEMISTRY (cont)

- Determine physical properties, like water solubility and mp and bp
- Learn some chemical properties (reactions)
- Apply this knowledge to biologically important compounds