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AIM: TO CARRY OUT THE CONSTRUCTION OF MOLECULAR MODELS (BALL AND STICK) WITH SUITABLE EXAMPLES

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Requirements

1. Ball
2. Sticks

Theory

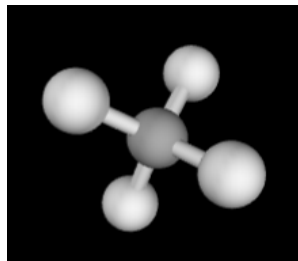
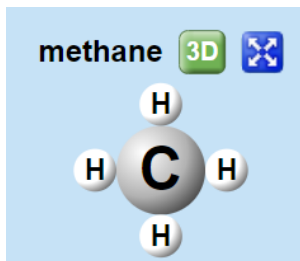
Chemical molecules or their actual behaviour could be understood in space or by 3D arrangements. Stereochemistry is a branch of chemistry which deals with spatial arrangement of molecules in space. We can understand this behaviour using “ball and stick” model where each atom will be represented by small sphere and each covalent bond is represented by a cylindrical stick.

Procedure

- Find the central atom of the compound.
- Take the bigger balls and label it as carbon.
- To the holes in the balls, attach the rods depending upon the number of bonds.
- Use the smaller balls as the side atoms like hydrogen.

Examples

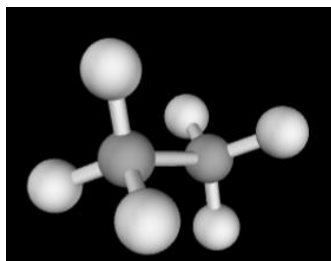
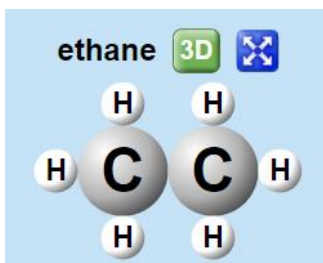
1. Methane



Properties of Methane

Methane is prototype of alkane series and considered as simplest hydrocarbon. It is flammable gas which is a chief component of natural gas. It has sp^3 hybridization and has four covalent bonds. Methane produces carbon dioxide and water after combustion. In the structure of methane, one carbon atom is connected with four hydrogen atoms via covalent single bond.

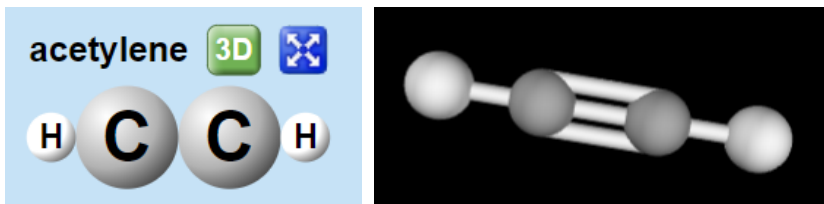
2. Ethane



Properties of Ethane

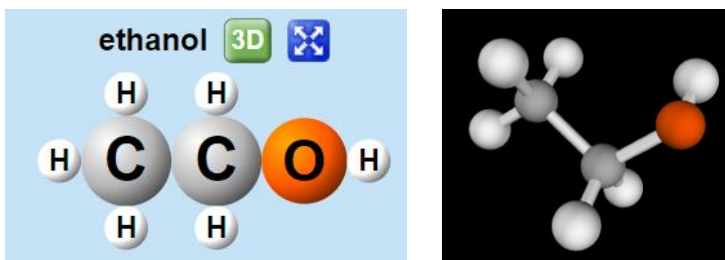
Ethane is a gas and second member of alkane series. Ethane is a saturated hydrocarbon containing two carbon atoms and six hydrogen atoms. It has the chemical formula of C_2H_6 . It has sp^3 hybridization and is tetrahedral in shape. In laboratory, it can be synthesized from sodium propionate. It is employed as a fuel for various purposes.

3. Acetylene



Acetylene is an unsaturated hydrocarbon and the first representative member of the alkyne series. It is also known as ethyne or vinylene. With oxygen gas, it has wide application in welding and cutting work. It contains two carbons and two hydrogens and has the chemical formula of C_2H_2 . Both carbon atoms are connected with each other *via* a triple bond. Every carbon atom is further linked with one hydrogen atom. It has sp hybridization and is linear in shape.

4. Ethanol

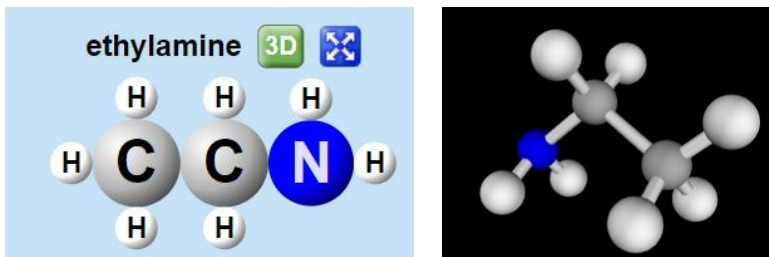


Properties of Ethanol

Ethanol is an alcohol and the second member of the aliphatic alcohol series. The molecular formula of ethanol is C_2H_5OH . It is a chief component of all alcoholic drinks. It is also employed as a vehicle for the preparation of various liquid medical formulations. It has a polar nature and is soluble in aqueous and non-aqueous

vehicles. At low doses, it is CNS stimulant but become CNS depressant at higher dose which is lethal.

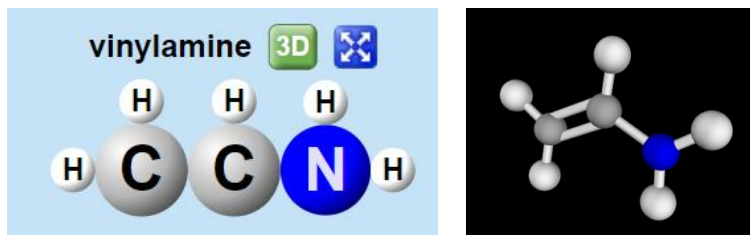
5. Ethylamine



Properties of Ethylamine

Ethylamine is a primary amine with the chemical formula of $\text{CH}_3\text{CH}_2\text{NH}_2$. It behaves as a nucleophile or Lewis base and can attack on electrophile to form covalent bond. In the structure of ethylamine, two carbons are connected by single covalent bond and nitrogen atom contains one lone pair of electrons.

6. Vinylamine

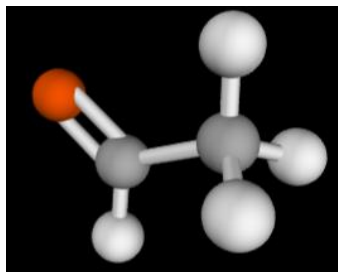
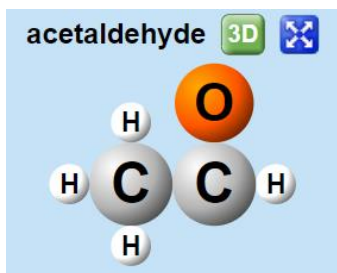


Properties of Vinylamine

Vinylamine exists as a tautomer of ethylenimine. Vinylamine is the monomer of polyvinylamine. However, the synthesis of PVAm takes place *via* the polymerization of *N*-vinylformamide with subsequent hydrolysis, since vinylamine itself

is not accessible. In the structure of vinylamine, two carbons are connected *via* double covalent bond.

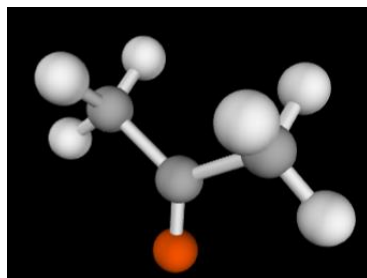
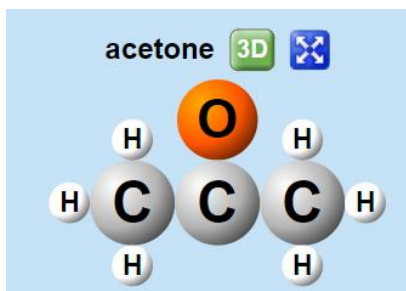
7. Acetaldehyde



Properties of Acetaldehyde

Acetaldehyde is also called as ethanal and it's a second member of aldehyde series with the chemical formula of CH_3CHO . It is a colourless liquid substance and used for multiple purposes like preparation of pharmaceuticals, perfumes, dyes etc. It contains two carbon atoms and one oxygen atom.

8. Acetone

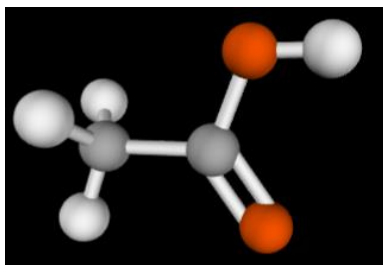
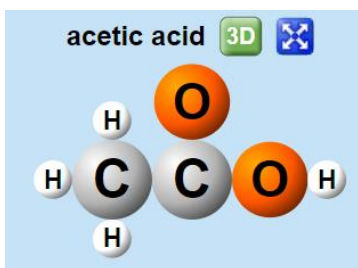


Properties of Acetone

Acetone is a first member of ketone series and its IUPAC name is propanone. It has three carbon atoms and one oxygen atom

with the chemical formula of C_3H_6O . It is also widespread in human blood and urine. Acetone is completely soluble in organic solvents and polar solvents. It is colourless volatile liquid and used as a vehicle in organic transformations as well as a reacting substance in many condensation processes. In the structure of acetone, middle carbon is connected with oxygen *via* double covalent bond to make it ketonic functional group.

9. Acetic acid

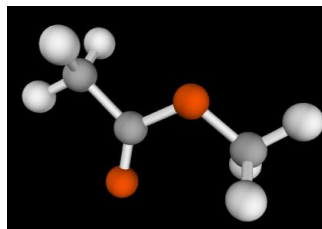
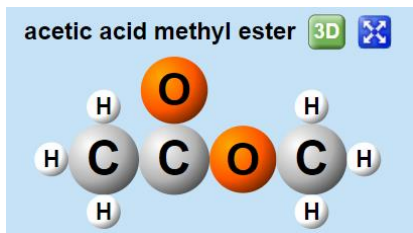


Properties of Acetic Acid

Acetic acid is second member of aliphatic carboxylic acid series with the chemical formula of CH_3COOH . It is chief components of vinegar with water and has pungent smell. Its IUPAC name is ethanoic acid which contains two carbons and two oxygen atoms. In the structure of ethanoic/ acetic acid, methyl group is connected with carboxylic functional group *i.e.*-COOH.

In the carboxylic functional group, carbon atom is attached with one oxygen atom *via* single covalent bond and with another oxygen atom *via* double covalent bond. Singly bonded oxygen is further connected with hydrogen atom with single covalent bond.

10. Methyl ethanoate



Properties of Methyl Ethanoate

It is a methyl ester of acetic acid with the chemical formula of $C_3H_6O_2$. It can be synthesized from acetic acid and methanol using esterification or condensation approach. It is a colourless liquid with fruity smell. It is abundant in various fruits like bananas, grapes, etc. In the structure methyl ethanoate, three carbon atoms and two oxygen atoms are present with ester functional group *i.e.* $-COOR$ where R is methyl group. In ester functional group, carbon atom is attached with one oxygen atom *via* single covalent bond and with another oxygen atom *via* double covalent bond. Singly bonded oxygen is further connected with alkyl group *i.e.* methyl group in this case.

Result: Percentage purity of Isoniazid solution is