I'm not a bot

Organic compounds are the most widely used compounds in chemistry as well as in everyday life. Any organic compound has only one chemical formula but can be represented on paper using various structural formulas as per our convenience and the complexity of the structure of the compound. In this article, we shall learn about the various structures used to represent organic compounds. Structural Representation of Organic Compounds An organic compound can be represented in the following ways: Complete Structural FormulaCondensed Structural FormulaBond Line Structure FormulaPolygon Formula 3D RepresentationComplete Structural Formula A complete structural formula is a simplified form of the Lewis point structure. Covalent bonds in organic compounds are denoted by a prime or dash (-). Single, double, and triple bonds can be represented by one, two, and three dashes, respectively. It also helps determine the number of bonds between elements. Some compounds with this representation are shown below. The complete structural formulas for Butanol, Chloroethane, and Propanoic Acid are, Complete Structural formulas for Butanol: CH3-CH2-CH2-CH2-OHComplete Structural formulas for Chloroethane: CH3-CH2-ClComplete Structural formulas for Propanoic Acid: CH3-CH2-COOH In the complete structural formula, it is our wish if we want to show the lone pair of electrons on the atoms or not. Condensed Structural Formula The complete structural formula can be further simplified by removing the dashes. The units that are repeated are put inside round parentheses and the number of times they repeat is put as a subscript after the parentheses. Shown below is an example of condensed structural formula. The chemical formula for propane in Condensed Structural form is, CH3-(CH2)3-CH3 In this formula we can see that CH2 is repeated 3 times, thus it is put in parentheses and a subscript of 3 is mentioned to denote that the group repeats 3 times. Bond Line Structural Formula This way of representing the organic compounds is preferred the most. It is very simple to write this formula. The bond between a carbon and a carbon atom is represented using a zig-zag line. The carbon and hydrogen atoms are not shown in this representation. If there is no other functional group at the end of the line, it is considered to represent the methyl CH3 group. The point where a line meets another line is considered to be a Carbon atom with an appropriate number of hydrogen atoms such that the valency of the carbon is satisfied. Thus, the joining point of the 2 lines represents the (CH2) group unless any other functional group is attached to the point. The bond Line Structural Formula of heptane is given below, Polygon Formula In organic chemistry, we also come across such compounds that are not linear but in the form of a ring and are known as cyclic compounds. Thus they are represented using a ring or a polygon. The number of sides in the ring or the polygon is based on the number of Carbon atoms in the compound. The sides of the chosen polygon to represent the compound is equal to the number of carbon atoms that are linked with each other to form the ring. The corners of the ring denote the carbon atom and the side represents the bond between the carbon atoms. If there is any functional group other than an alkyl group attached to any carbon atom then it is shown attached with a dash that is attached to the ring. The Polygon Formula of Phenol is given below, In the above example, the use of a square shows that the ring contains 4 carbon atoms. Also, note that the -OH group is attached to the ring with a dash. 3D Representation All the representations that we have seen so far are 2D representations of the organic compounds but in the real world, they are 3D in nature. Thus to represent the organic compounds in 3D, we use this representation which makes use of wedge and dash representations. The bonds are represented using a line, solid wedge, and dashed wedge depending on the condition if the bond is in the plane of the paper, the bond is outside of the plane of the paper, and inside the plane of the paper respectively. The 3-D representation for CH4 is shown below: Also, Read Answer: We know that the terminals represent the methyl groups and the joints represent the carbon atoms in the bond line formula. The number of Hydrogen attached is such that the valency of carbon gets satisfied. Thus in the given compound, there are 5 Carbon and 12 Hydrogen atoms. Question 4: What are the different ways to represent the structure of organic compounds? Answer: An organic compound can be represented in the following ways: Complete Structural FormulaCondensed Structural FormulaBond Line Structure FormulaPolygon Formula3D representation