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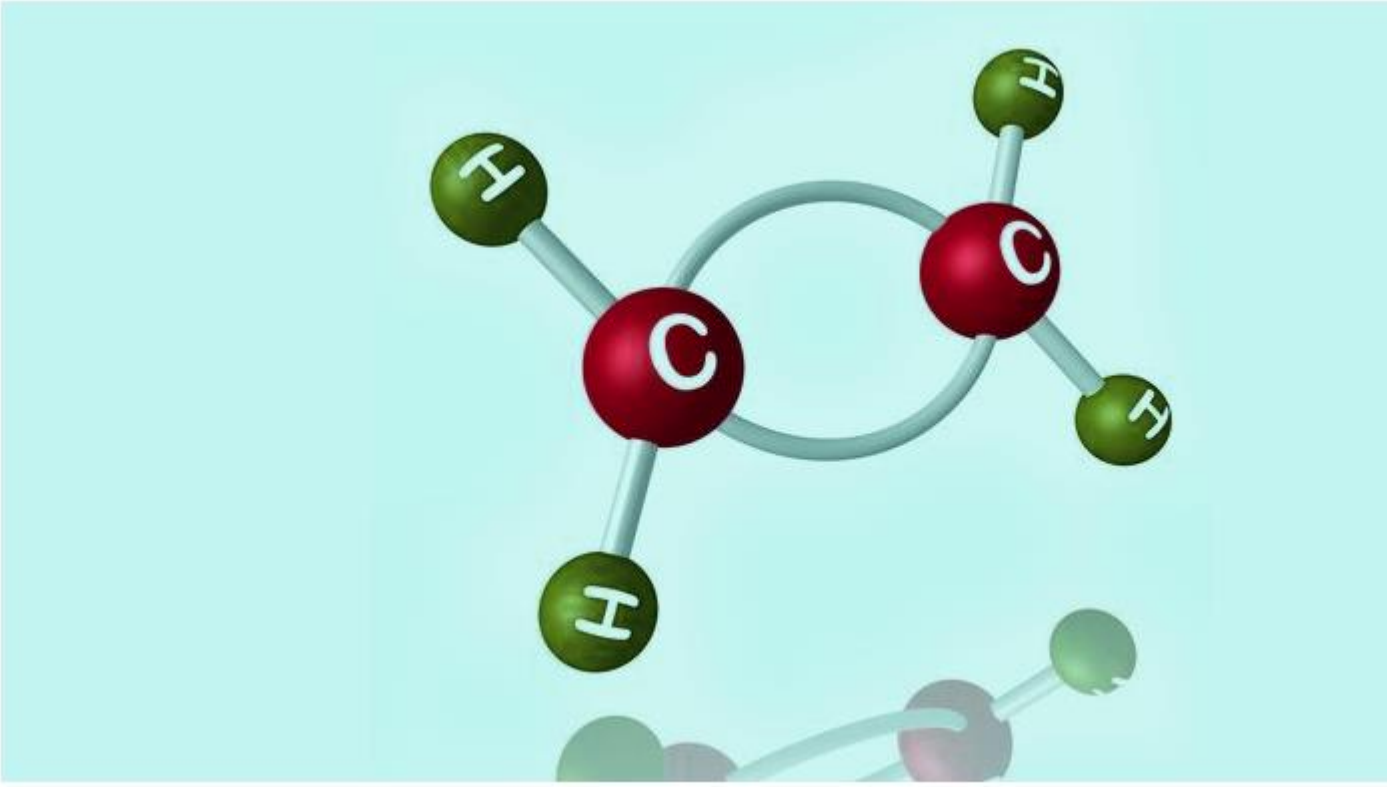
Organometallic Compounds are chemical compounds which contain at least one bond between a metallic element and a carbon atom belonging to an organic molecule. Even metalloid elements such as silicon, tin, and boron are known to form organometallic compounds which are used in some industrial chemical reactions.

The catalysis of reactions wherein the target molecules are polymers or pharmaceuticals can be done with the help of organometallic compounds, resulting in an increase in the rate of the reactions.

Generally, the bond between the metal atom and the carbon belonging to the organic compound is covalent in nature. When metals with relatively high electropositivity (such as sodium and lithium) form these compounds, a carbanionic nature is exhibited by the carbon which is bound to the central metal atom.



An example of an organometallic compound wherein carbons belonging to a benzene molecule bond with chromium is illustrated above. A few more examples of these types of compounds are Grignard reagents, tetracarbonyl nickel, and dimethyl magnesium.

Properties of Organometallic Compounds

A few properties of organometallic compounds are listed below as short points.

- The bond between the metal and the carbon atom is often highly covalent in nature.
- Most of the organometallic compounds exist in solid states, especially the compounds in which the hydrocarbon groups are aromatic or have a ring structure.
- The compounds consisting of highly electropositive metals such as sodium or lithium are very volatile and can undergo spontaneous combustion.

- In many cases, organometallic compounds are found to be toxic to humans (especially the compounds that are volatile in nature).
- These compounds can act as reducing agents, especially the compounds formed by highly electropositive metals.

From the points given above, it can be observed that the properties of organometallic compounds differ amongst each other based on the properties of the metals that constitute them.

Applications

Organometallic Compounds have a broad range of applications in the field of chemistry. Some of them are given below-

- In some of the commercial chemical reactions, organometallic compounds are used as homogeneous catalysts.
- These compounds are used as stoichiometric reagents in both industrial and research-oriented chemical reactions.
- These compounds are also used in the manufacture of some of the semiconductors, which require the use of compounds such as trimethylgallium, trimethylaluminum, trimethylindium, and trimethyl antimony.
- They are also used in the production of light emitting diodes (or LEDs).
- These compounds are employed in bulk hydrogenation processes such as the production of margarine.
- These compounds are used as catalysts and reagents during the synthesis of some organic compounds.
- The complexes formed from organometallic compounds are useful in the facilitation of the synthesis of many organic compounds.

The points given above emphasize the importance of organometallic compounds. However, they are also the cause of many environmental concerns due to the highly toxic nature of some of these types of compounds