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Reasons behind the Chemical Reactions in the Chemical Compounds

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DESCRIPTION

Reactivity has a murky definition in chemistry. It seems to take into account both kinetic and thermodynamic aspects, i.e., how quickly and if a material responds at all. They are actually two separate phenomena that frequently depend on temperature. For instance, it is widely believed that the reactivity of group one metals (Na, K, and so forth) increases in the lower groups of the periodic table or that a substance's reactivity may be seen in the interaction of hydrogen with oxygen. Alkali metals' rate of reaction is actually influenced by particle size and group location, as evidenced by their interaction with water. Hydrogen does not combine with oxygen despite the huge equilibrium constant until a flame initiates a radical reaction that culminates in an explosion.

When the phrase is used exclusively to describe reaction rates, a more consistent viewpoint becomes apparent. Reactivity then refers to how quickly a synthetic material will typically undergo a compound response over time. Reactivity in pure mixtures is controlled by the example's actual qualities. For instance, a sample's reactivity can be increased by increasing its specific surface area. The reactivity of impure substances is also influenced by the presence of impurities. Crystalline substances' reactivity may be impacted by their crystal structure as well. However, in every instance, reactivity is primarily caused by the compound's sub-nuclear characteristics.

The phrase "material X is reactive" is frequently used, yet not all compounds react with all reagents. For instance, when we say that "sodium metal is responsive," we mean that it reacts with a variety of common reagents, such as pure oxygen, chlorine, hydrochloric acid, and water, or that it may react fast with them at either room temperature or when using a Bunsen fire.

Stability and reactivity is not the same thing. For instance, an isolated oxygen molecule in an excited electrical state spontaneously emits light after a statistically determined amount of time. A species' half-life is another sign of its stability; however the responsiveness of a species can only be discovered through interactions with other species.

Atomic and molecular orbital theory as well as the simpler valence bond theory can be used to explain the atomic and molecular level of the second meaning of "reactivity," which refers to whether or not a substance interacts. In accordance with the rules of thermodynamics, a chemical reaction occurs because the products as a whole have a lower free energy than the reactants. Quantum chemistry offers the most complete and accurate explanation of why this happens. Most of the time, the results of solving the Schrodinger equation for a given situation reveal that electrons exist in orbitals.

For the same reason, carbon almost invariably forms four bonds. In its ground state, the valence configuration is 2s2 2p2, half filled. But because the activation energy needed to go from partially filled to fully filled p orbitals is so minimal, carbon produces p orbitals almost instantly. Meanwhile, a lot of energy is released during the process (exothermic). Sp3 hybridization is the name for this four equivalent bond configuration.

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CONFLICT OF INTEREST

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