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Commentary

Scientific Innovations of Catalysis and its Functioning

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DESCRIPTION

Catalysis is defined as the increase in the rate of a chemical or biochemical process caused by a material known as a catalyst that is not consumed during the reaction and can theoretically continue endlessly in a cyclic fashion. Apart from this, catalysis is a science that relies on a variety of other disciplines, including chemistry, physics, biochemistry, electronics, design modelling, engineering, and biology, and the integration of these disciplines is critical for the development of novel catalytic processes. All nobel laureates in chemistry in the last 100 years have been pioneers in their fields, such as the creation of new catalytic processes, methodologies, and catalysts. The crucial mechanical steps in the various catalytic activities, as well as the potential conditions that can trigger inactivation, are currently well understood. This knowledge led to the development of new catalytic methods and the characterization of catalysts that greatly cut process time and improve product yield.

Scientific innovation has been motivated by society's quest to better all elements of life since the ammonia synthesis process, which is considered the beginning of industrial catalysis. The advancement of major industrial areas such as energy, pharmaceuticals, chemicals, food, and petroleum has relied heavily on scientific and industrial innovation. These industries are involved in the creation of new energy sources, environmentally friendly processes, clean and efficient techniques, unique chemical products, waste treatment, recycling, and the manufacturing of the majority of today's usable materials. Catalytic procedures using environmentally friendly technologies and heterogeneous catalysts, in particular, have proven to be a promising area for drug development. For instance, the innovative use of nanostructured various catalysts, drug multiscale strategies, superficial science (seamless capsules), and alternative energy bases (dye-sensitized solar cells), may decrease the environmental influence while sustaining high production. The employment of innovative chemical catalytic processes to boost the energy levels produced from biomass or to turn raw materials into useful compounds has been a major trend in the recent decade. Green chemistry techniques that use photo electrochemical cells to produce hydrogen gas from photo catalytic water splitting; for example, can be used to produce energy more efficiently [1]. Novel catalysts have also improved the lifetime of fuel cell stacks and allowed for the creation of catalytic membrane reactors that convert syngas to liquid hydrocarbons. A novel iron modifying catalyst that eliminates carbon dioxide from seawater, a plentiful natural resource, has been used to produce hydrogen in an environmentally friendly and safe manner [2].

Biocatalysts (Enzymes) are another type of catalyst that helps live cells speed up key biological processes. Enzymes have been used in novel ways to extract organic material from wastewaters [3]. The cosmetic, food, and pharmaceutical industries are all interested in recent progress in the enzymatic production of biologically active phospholipid derivatives using an organic salt solvent that is environmentally friendly, increases selectivity, and simplifies the isolation and purification process.

The creation of biosensors has been aided by the introduction of laccase-like multicopper oxidase pigments from *Aspergillus* sp. for heterogeneous bio catalysis of phenols [4]. A biosensor is made up of a biological unit that can interact with a target precisely and a transducer that can convert a change in the property of a solution or surface into a registrable signal. Another significant advancement has been made in the field of biomarkers (substance that can be related to the physiologic and pathologic activity of organs, tissues, or cells). Catalytic iron, for example, has been linked to oxidative stress during vascular injury, therefore its early detection in serum aids in the diagnosis and treatment of coronary syndromes [5,6].

Furthermore, complete microbes have been used in a variety of processes, including the removal of harmful chemicals and heavy metals using their bio adsorbent properties, electricity generation using their resemblance to fuel cells, stereo selective

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synthesis of bioactive compounds, and the production of green concrete. Bacteria can also be utilised as biosensors, for example, to assess biochemical demand oxygen as a key metric for monitoring water contamination. New novel solutions to solve long-term challenges will have a significant impact on the field of catalysis in the future. The use of chelating compounds to capture pollutants, the production of extremophiles (microorganisms that can grow in severe settings) as biocatalysts, and the development of tailored enzymes to cure cardiac disorders are just a few examples.

REFERENCES

1. Novoselov A, Kostya S, Andre K Geim, Morozov VS, Jiang D. Electric field effect in atomically thin carbon films. Science. 2004;306(1): 666-669.
2. Chung C, Kim YK, Shin D, Ryoo SR. Biomedical applications of graphene and graphene oxide. Acc Chem Res. 2013;46(1): 2211-2224.
3. Zhu K, Yanwu A, Murali S, Cai W, Li X. Graphene and graphene oxide: Synthesis, properties, and applications. Ad Mater. 2010;22(1): 3906-3924.
4. Sasha S, Dikin DA, Piner RD, Kohlhaas KA. Synthesis of graphene-based nanosheets via chemical reduction of exfoliated graphite oxide. Carbon. 2007;45(1):1558-1565.
5. Cancan H, Li C, Shi G. Graphene based catalysts. Energy Environ Sci. 2012;5(1):8848-8868.
6. Sergio N, Dhakshinamoorthy A, Alvaro M, Garcia H. Carbocatalysis by graphene-based materials. Chem Rev. 2014;1141(1): 6179-6212.