



CHEMICAL REACTIONS AND CATALYSIS FOR CREATING A SUSTAINABLE FUTURE

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Abstract –

Chemical reactions and catalysis have the most impactful role in the research area. Catalysis has a more sustainable future; therefore, the radical overhaul is being highlighted in modern chemistry. Catalysis is the most critical natural resource; moreover, lowering the activation energy process is being highlighted with the support of this catalysis. New bonds with the base of a new combination are allowed to be addressed with the support of catalysis. Primary pollution control, therefore, and renewable feedstocks are the two main factors that are addressed with the help of this catalysis process. A chemical reaction is considered a process that is capable to convert one reactant to another.

Chemical transformation is allowed to be highlighted and changes in the position of the electrons are the main factor that is addressed within the chemical reaction. Sustainable future development is based on chemical reaction, moreover, radioactive elements has a significant role in chemical reaction. Chemical concentration becomes increased with the support of the chemical; reaction, moreover, the electromagnetic reaction has to be highlighted. Chemical, physical, therefore, biological science is based on chemical reaction; therefore, 85–90% of chemical processes is included in catalysis. Additionally, Primary energy consumption improves with the dependence on catalysis.

Keywords- Catalysis, Chemical Reaction, Energy consumption, Radioactive elements, Atoms, Electrons, Atomic model

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I. INTRODUCTION

Catalysis is a factor that is responsible for speeding up the rate of the chemical reaction. With low temperatures and low energy consumption, a chemical reaction is highlighted with the dependence on catalysis [1]. The key feature of a catalyst is that it is capable to take part in the chemical reaction, hence, undergoing without any permanent changes. The rate of the chemical reaction becomes forward and backward with the dependence of the chemical reaction, thereafter, the rate of the reaction has to be highlighted and chemical changes are measured. Facilitation of a reaction is the main role of a catalyst in the chemical reaction; therefore, sustainable development in the future is highlighted with the support of the impactful role of a catalyst [2]. Bonds between the molecules and atoms are breakdown and new combinations

of the substances are highlighted with the dependence of the chemical reaction. The more energy-efficient reaction is being facilitated with the dependence on a catalyst, moreover, enhance the amount of the products is also improved. On the other hand, unwanted byproducts are reduced with the support of a catalyst, and potential uses of the substances are allowed to be highlighted with the effectiveness of the catalyst [3].

Reduction of hazardous substances is another essential factor that is facilitated with the aid of the catalysts; thereafter, the design, manufacture, and chemical structure of the newly created substances are allowed to be highlighted with the aid of a catalyst [4]. Sustainable chemical development is based on chemical reactions and catalysts have a significant role to boost the rate of chemical reactions. The energy barrier become

reduces with the dependence on the proper catalysts; moreover, the reactant becomes more

activated and helps to generate the rate of the chemical reaction [2].

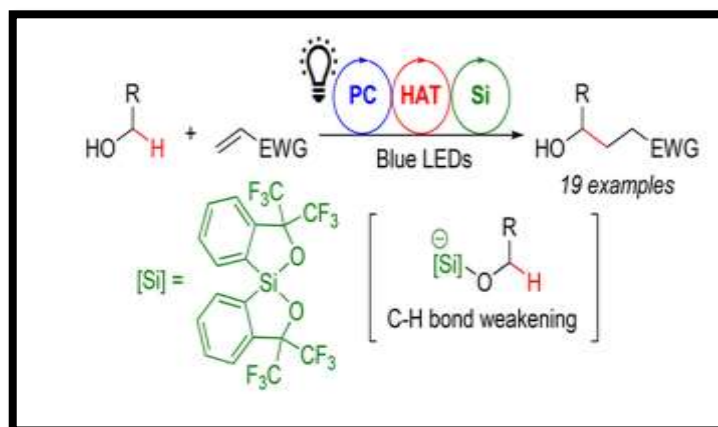


Figure 1: Identification of the catalyst
(Source: 3)

Figure 1 helps to identify the catalysts with the support of the chemical reaction. Therefore, it is noticed that blue LED is used as a catalyst in this chemical reaction which is capable to accelerate the rate of the reaction.

II. OBJECTIVES

There are different researches objectives are allowed to be mentioned below:

- To analyze the role of catalysts in a chemical reaction
- To understand the factors which have a potential role to create a sustainable future
- To identify the characteristics of the catalysts
- To explain the pros and disadvantages of the catalysts
- To address the role of asymmetric catalyst

III METHODOLOGY

The impact of the catalysts to generate the chemical reaction is allowed to be highlighted within this research topic. On the other hand, the advantages and also disadvantages of chemical reactions for a sustainable future are being highlighted [5]. Different characteristics of the different catalysts are addressed in this section. Therefore, all catalysts created the information being adopted from the different online sources. Therefore, google scholar plays an essential role to grab information about the research topic. Basic information which is related to the chemical reaction is allowed to be collected from the

different articles and research papers [6]. Reactant concentration and the physical state of the reactant are the main two factors that have to be facilitated by chemical reactions. Popersotional reaction of the chemical substrate is being highlighted and it helps to improve the structure of the chemical reaction [7]. Researchers use different resources to gather more information about the research topic. The role of the catalysts within the chemical reaction is highlighted by this research study [10].

IV. IDENTIFICATION OF THE ROLE OF THE CATALYST IN A CHEMICAL REACTION

Enhancing the rate of the reaction is highlighted with the efficiency of catalysts. With the support of the catalysts, the reduction of the activation energy is an important term that is allowed to be highlighted with the dependence of the chemical reaction [8]. Speed up the rate of the reaction is another key term that is allowed to be addressed with the dependence of the catalysts. Thereafter, the chemical mechanism has to be highlighted and it helps to bring sustainable future growth [9]. In biochemical reactions, catalysts have a positive role, thereafter; the reaction rate is bringing increased with the dependence on the catalyst. The production rate of the new substance is highlighted with the support of the catalysts, additionally; the development of the rate of the biochemical reaction is also being generated by the use of specific catalysts in the chemical reaction.

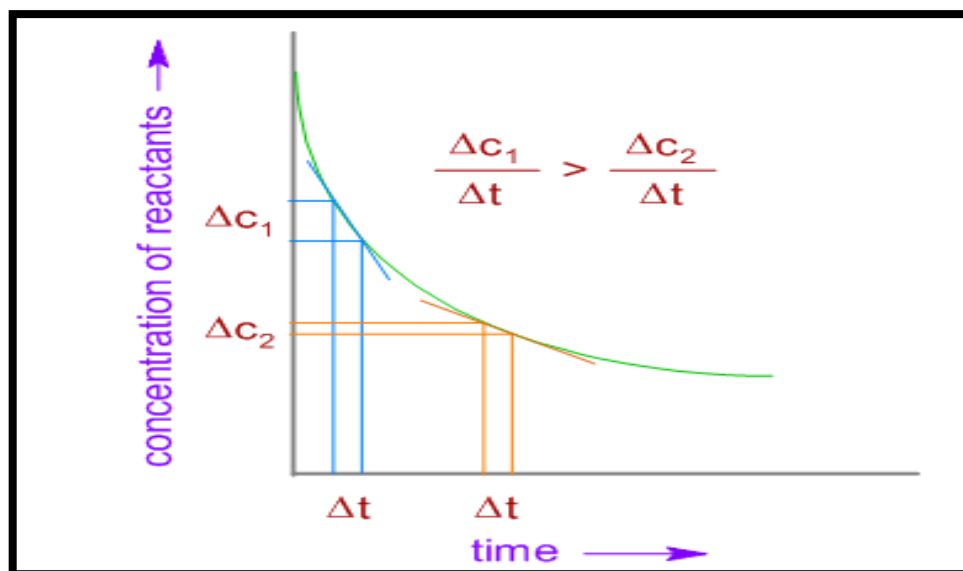


Figure 2: Concentration of reaction based on time
(Source: 6)

Figure 2 helps to analyze that the concentration of a chemical reaction is based on time. Therefore, it is also noticed that the reaction rate is allowed to be highlighted with the support of catalysts, and it can be allowed to enhance the concentration of the reaction [7]. Enzymes are proteins that act as a catalyst that helps to increase their rate of biomolecular reaction. Changes in the reactants of the molecules are allowed to be addressed with the support of catalysts, thereafter, effective exchanges of the chemical reaction have to be developed, and sustainable future development is being addressed. Asymmetric growth of the reactions is highlighted and changes in the mode of the chemical reaction are developed.

V. IDENTIFY THE CHARACTERISTICS OF THE CATALYSTS

Catalysts are the factors that help to improve the speed of the reaction; therefore, permanent changes in the substances do not change due to chemical reactions [8]. The main feature of catalysts is that it does not consume by chemical reaction, thereafter, facilitation of the time is being addressed and helps to improve the rate of production. Catalytic activities become higher at the optimum temperature, thereafter; activation energy becomes lower with the help of catalysis [9]. Homogeneous, Heterogenized homogeneous, Heterogeneous, and Biocatalysts are the main four types of catalysts that have a potential role in chemical reactions.

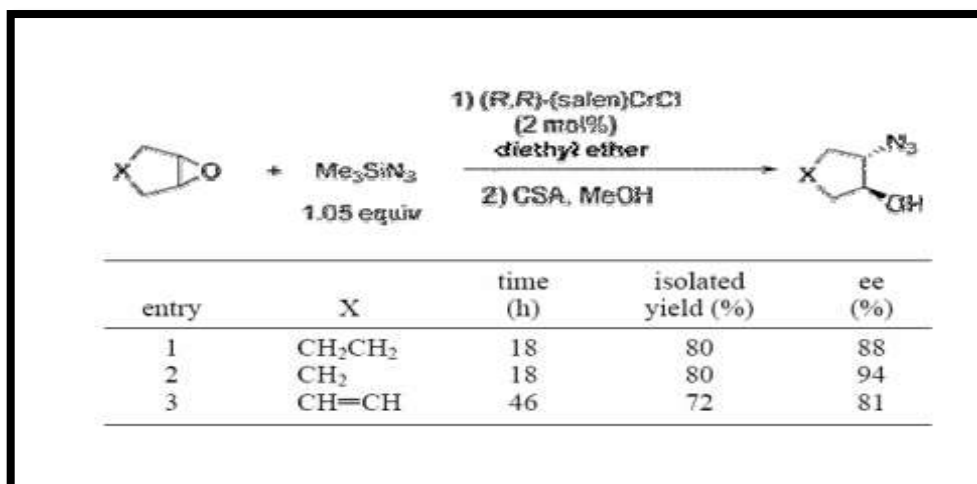


Figure 3: Asymmetric Exposed Opening
(Source: 10)

Figure 3 is based on the exposed Opening; therefore, it helps to generate the basic hydrolytic process. Hydroxide nucleophile becomes attracted due to SN2 reaction, and in this reaction NuC act

as a catalyst [11]. Dimeric catalyst is capable to enhance the efficiency of the chemical reaction, thereafter; organic solvent sometimes acts as a chemical catalyst.

VI. ADVANTAGES AND DISADVANTAGES OF THE CATALYSTS

There are some advantages, and disadvantages highlighted during the chemical reaction which have to be mentioned below:

Advantages of Catalyst	Disadvantages of Catalysts
Speed up the rate of the reaction is highlighted by catalysts. Therefore, it is considered a money-saving substance.	Catalysts become more expensive to buy.
New products have to contract with low time investment.	Different types of toxic waste are produced during chemical reactions.
Lowers the production costs are generated with the support of catalysts	Catalysts are often toxic and the wastage of products becomes addressed.
With the aid of catalysts, lower temperatures become bruises. Therefore, reduction of the energy consumption is highlighted by the use of catalysts. Sustainable development is improved by using catalysts.	Different catalysts are used for different chemical reactions. Moreover, it is very difficult to collect different catalysts as it is very high in the price range.

It helps to address the advantages and disadvantages of catalysts; therefore, numerous green chemistry has to benefit from catalysts. Thereafter, the rate of the reaction is allowed to be highlighted and it helps to develop the high degree of the reaction between the reactant molecules and the catalysts [14].

generated with the aid of this catalyst process. Additionally, a unique energy transformation process is being generated and it helps to improve the rate of the reaction [3]. It is a selective catalyst that helps to generate C-C bonds. Direct information about the chiral compounds is highlighted by chemical reaction, thereafter; the chemical structure of the substrate is highlighted. Valuable application of the selected substrate is highlighted with the aid of this catalyst. On the other hand, widening the scope of these catalysts becomes analyzed within this study [9].

VII. ROLE OF ASYMMETRIC CATALYST

The valuable reaction which formulates the chiral compound is highlighted by this asymmetric catalyst. Therefore, the synthetic method is being

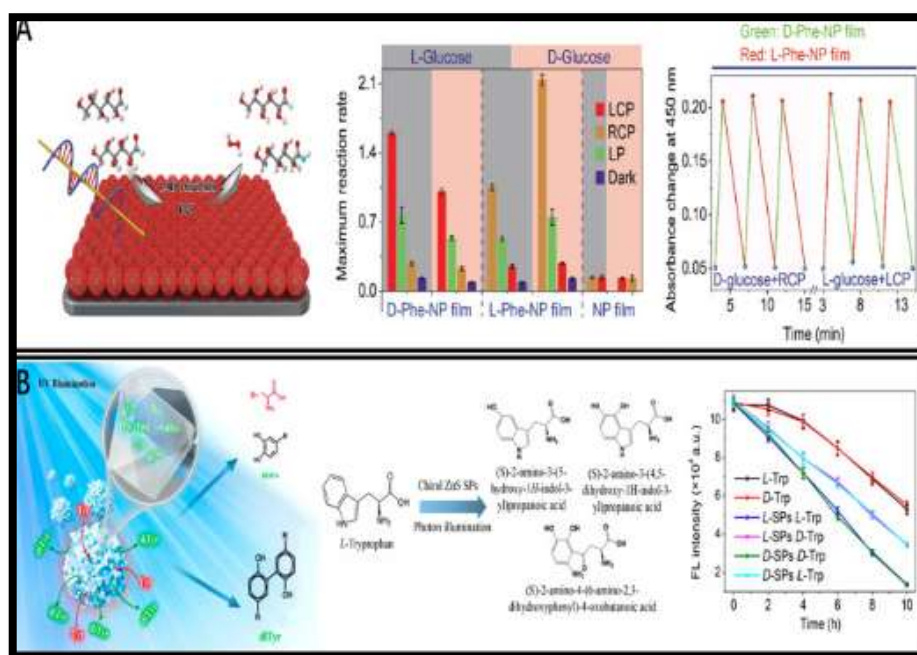


Figure 4: Uses of asymmetric catalyst
(Source: 8)

Figure 4 helps to analyze the role of the asymmetric catalyst within the chemical reaction. Thereafter, it is noticed that organometallic molecules become affected by this catalyst. The main role of this catalyzed is based on medicinal chemistry, thereafter; development of the understanding of the mechanism of the substrate is being developed by this chemical reaction. Peptidomimetics in drug candidates use this catalyst [10].

IX. ATOMIC MODEL

Chemical reaction structure is highlighted with the support of the atomic model; therefore, electron configurations have a significant role in the chemical reaction. Electrons move freely between the achieve stability and atoms. Therefore, with the support of the chemical reaction, the rearrangement of the chemical structure of the substant is highlighted [16]. Thereafter, the boosts up of the reaction are being addressed. Specific entities which are based on the structure of the atoms are allowed to be generated and it helps to bring significant results within the reaction [17].

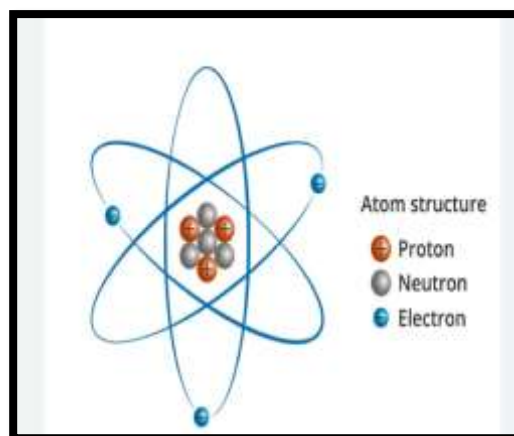


Figure 5: Atomic model

(Source: 10)

Figure 5 is based on the atomic model which helps to generate the rate of the reaction. Selectivity is the key feature of the catalysts; moreover, the direct reaction becomes highlighted [3]. The reduction of unwanted byproducts is highlighted by the use of this chemical reaction. Entirely new materials are developed and it helps to boost the speed up the reaction rate.

EXAMPLES OF CATALYTIC REACTIONS				
Type	Reaction Phase(s)	Reaction	Catalyst	Name of Process/Reaction
homogeneous	gas	ozone \rightarrow oxygen	chlorine atom	ozone depletion
	liquid	alcohol + acid \rightarrow ester	sulfuric acid	Fischer esterification
	liquid	arsine + acid chloride \rightarrow ketone	aluminum chloride	Friedel-Crafts acylation
	liquid	methanol + CO \rightarrow acetic acid	rhodium salts + I ⁻	Monsanto process
heterogeneous	gas-solid	3H ₂ + N ₂ \rightarrow 2NH ₃	iron	Haber process
	gas-liquid-solid	alkene + H ₂ \rightarrow alkane	transition metals such as Pt and Pd	catalytic hydrogenation
	gas-solid	crude oil \rightarrow gasoline	zeolite	catalytic cracking
	liquid-solid	waste water + H ₂ O ₂ (O ₂) \rightarrow clean water	titanium dioxide	photocatalysis
enzyme	water	starch \rightarrow D-glucose	α -Glucosidase	hydrolysis
	water	cellulose \rightarrow D-glucose	β -Glucosidase	hydrolysis

Figure 6: Example of Catalytic Reaction

(Source: 5)

Figure 5 is highlighted by different catalytic reaction which is denoted by chemical reaction. Powerful catalyst helps to transform the chemical sector, thereafter; new pharmaceutical products are produced by the chemical reaction which helps to bring sustainable growth to the industry [5].

X. PROBLEM STATEMENT

Catalysts boost the rate of the reactions; therefore, different disadvantages are highlighted due to the

use of catalysts. Catalysts become very expensive, therefore, different wastages rate are produced during the use of the catalysts [10]. On the other hand, these catalyze become very poisonous to the environment, Impurities become generated and it reduces the rate of the reaction. The physical state of the substance is unknown due to chemical reactions; moreover, this comical reaction hurts the environment [9].

CONCLUSION

Lowering the activation energy is the main factor that is generated by chemical reactions. Thereafter, the process of breaking the structure of atoms is highlighted with the aid of these catalysts. New combinations of the substance are produced due to chemical reactions; moreover, specific catalysts help to generate this reaction.

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