Research Journal of Advanced Multidisciplinary Insights (RJAMI)
ISSN: 3139-1559 | Vol. 2, Issue-01, Jan-June, 2026 | pp. 01-11

Chemical Reactions Affecting the Energy, Emotion, and Method of Application

Jiten Mishra[1*]

[1]Roland Institute of Pharmaceutical Sciences, Khodasingi, Berhampur, Odisha

*Corresponding Author E-mail: jitenmishra@gmail.com

Abstract

Chemical energy is the basis of various technologies, and the application of such technologies depends on their implications. Thus, the primary aim of the study was to understand the implications of different chemical reactions for energy. In order to develop the study and overall identification of chemical separation through leaching is described. After that, the lump kinetic model helped to establish the mathematical basis of the process chemical that emits energy. Similarly, the study identifies different problems that help understand the process of chemical energy creation. Additionally, the process of generating chemical energy involves a different kind of reaction.

Keywords- Lump Kinetic Model, Chemical Reactions, Chemical Energy Application, Mathematical Basis of Chemical Lumping

Received: Jan. 10, 2026 **Revised: March 19, 2026** **Accepted: May 28, 2026** **Published: June 01, 2026**

DOI: https://doi.org/10.64474/3139-1559.Vol2.Issue1.1

https://rjami.nknpub.com/1/issue/archive

I. INTRODUCTION

The ability to create and store chemical energy has been an evolutionary process, providing the base of technological improvement. Moreover, there are reactions that require a strong internal molecular structure to create a system with multiple usages. Such chemical energy has different proposed implications in Sanders' models of quantum computation in order to initiate simulation at a quantum level. Thus, the energy created by a chemical reaction depends strongly on the reaction mechanism and the size of the molecules involved. Additionally, such reactions have been important

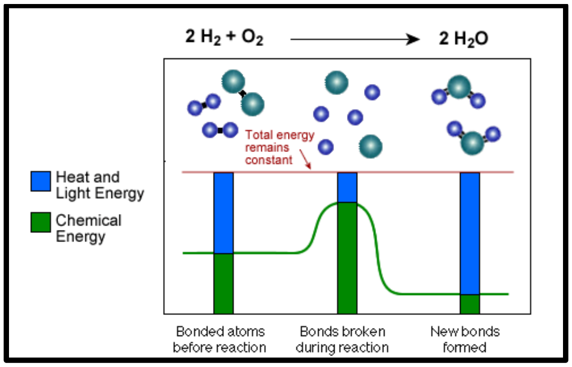

Figure 1: Chemical energy production

Hence, the following study discusses the chemical reactions that directly or indirectly affect the implications of the energy produced in chemical reactions involving different molecules. To explain the same lumped model, the study examines chemical energy release, which helps understand the consistency of energy release for specific chemical reactions [2]. Additionally, secondary method research is used to reach a specific solution regarding the use of energy generated through chemical reactions, according to the process of energy creation and storage. Moreover, advances in energy emission experiments and the ability to control molecules have enabled different approaches to the implications of energy, and additional processes of implication have been proposed through the experiments [3].

II. OBJECTIVES

In order to develop a rational study with fractal data, the following study has been developed using the following objectives were followed throughout

- To explain the process of energy creation from a chemical reaction
- To explain the process of energy creation using the lumped model for chemical energy release
- To elaborate on the problems of energy chemical reaction impact energy release
- To describe different energy-emitting reactions and their implications
- To suggest a specific solution in order to reduce the impact of hindrance in the chemical reaction

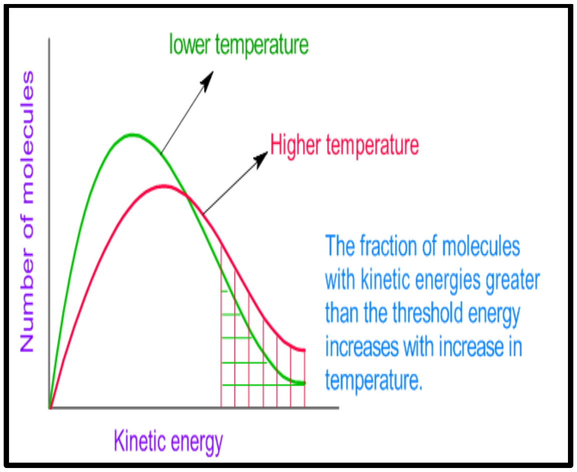

Figure 2: Impact of temperature on chemical energy production

III. METHODOLOGY

Chemical reactions are inherently unpredictable; additionally, the amount of energy released is not specific. Thus, in order to study chemical reflection impaction, the process of a chemical reaction and a secondary method of data collection were used; additionally, the data were analysed using the process of qualitative analysis. The secondary qualitative method of analysis provides verified information in order to explain a topic [9]. Thus, using a secondary qualitative method enables a rationalised study. At the same time, the secondary methods of study help to analyse a wider spectrum in order to develop reliable results.

IV. CHEMICAL SEPARATION

The process of chemical leaching process is related to the process of energy creation through mass transfer. In addition, the process of chemical leaching involves different liquids and solids that help to release energy [4]. Therefore, the chemical leaching process becomes one of the important aspects in order to use energy from chemically active solids and liquids. Moreover, the solution used in the process requires being unstable in order to pair with other molecules and produce waste. On the other hand, such molecules require releasing electrons in the form of energy. Such energy is used in the process of development [6].

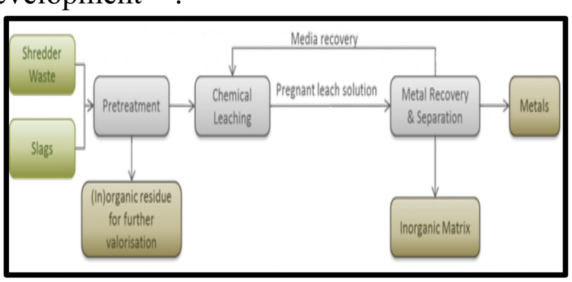

Figure 3: Separation of chemicals in energy production

The process of chemical leaching is a process of mass transfer that involves two different phases of chemical reactors. For instance, chemical leaching involves the solid and liquid phases of different chemicals, which release energy after the reaction [7]. Moreover, the solid phases are a combination of inert solids and different solutions. On the other hand, salute the reaction of a chemical process that requires release in the process of reaction. The inert solution remains unchanged at the end of the reaction as it is not reactive due to the inert molecule having a stable structure [5]. Thus, the quantity used in the initial phases and the quantity at the end remain unchanged at the end. For chemical leaching, solvents are chosen in a way that when the solvent reacts with the solids the solvent enters the solid phases and releases energy. Ty process of Chemical leaching process is widely used in order to extract ore; however, it is relevant for understanding energy release for a chemical relationship.

V. LUMP KINETIC MODEL

Development of a Lump kinetic model in order to describe the process, chemical energy implication, inherently nonlinear lumping techniques is reliable. Additionally, implementing time-scale separation helps to understand the process of energy formation from chemical reactions. Moreover, such techniques help to define the invariant manifold for a given transformation in the state space. For nonlinear lumping, the transformation of the concentration of different molecules is presented as:

$$c\hat{} = h\ (c)$$

Where the operator of lumping transformation is denoted by **h** [17]**.** Thus for a reaction, the network is expressed as

$$dc/dt = f(c;k),\ c(to)\ )\ co$$

Where c is the vector of concentration, K is the reaction vector, and the kinetic energy realised is described as F.

Therefore, after the development of the concentration of different molecules, is above expression is presented as

$$dc\hat{}/dt = hc[hh\ (c\hat{}\ )]\ f\ [(hh\ (c\hat{}\ )]$$

Jacobian matrix of h(c) is described as h

ISSN: 3139-1559 | Vol. 2, Issue-01, Jan-June, 2026 | pp. 01-11

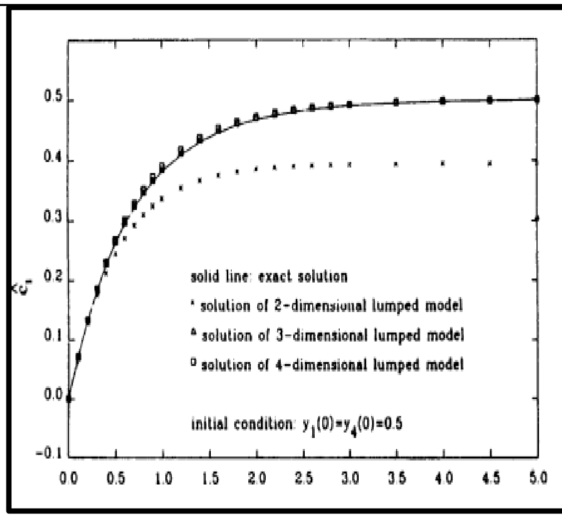

Figure 4: Graph of lump model with temperature

For the chemical reaction, the above expression describes that overall lumped models are in a full simulation process moreover the development of Different solutions is described according to the graph. The above graphs describe the energy emission in relation to time that further different dimensions of the lumped kinetic model [15]. Thus, the lumped kinetic model is expressed through an equation of:

$$\{\varphi 1(y,z),\varphi 2(y,z),...,\varphi m(y,z),y1,y2,...,yn\hat{}\}$$

For the model expressed in the above equation *M* is an operation that is mainly founded at the time of defining transformation for the operator *S* such that M is expressed as

$$M = e^{-S} A^{eS}$$

Therefore, the above operators help to understand the different levels of the kinetic energy release [11]. Additionally, there are chances of error in such calculation, therefore, the following table describes the overall percentage of error for the Shrinking core model and Lump model.

Temperature, K	The Percentage of Average Error, %	
	Shrinking Core Model	Lump Model
303	196.97	51.35
333	108.89	29.39
358	119.74	40.09
The average value	141.86	40.28

Figure 5: Separation of chemicals in energy production

(Source: 9)

From the table, it can be seen that the error percentage in the Lump model is low hence; the lumped model becomes an improved module in order to describe the process of chemical energy creation. Moreover, due to the presence of different time expressions, the lumped model defines different levels of energy creation. Thus, a mathematical expression is possibly present in order to describe the reaction

VI. STEPS OF CHEMICAL ENERGY CREATION

The process of chemical energy creation mainly has 5 steps that completely describe the process of creation. Mostly, the exothermic reactions are responsible for producing energy-forming reactions [8]. The initial phase of a chemical reaction is synthesis. Additionally, there are decomposition, single replacement, combustion and double replacement reactions, which help create energy.

A. Synthesis reaction

A synthesis reaction is described as a reaction that occurs at the time of interaction with each other. Additionally, such a reaction formulates a completely new molecule [10]. Such newly formulated molecules might or might not be reactive. The reactive nature of a molecule completely depends on the last lone pair of electrons. Additionally, a reactive end product initiates further reactions, thus a chain of reactions that releases energy is possible with a synthesis reaction.[17]. Thus, the method of a Synthesis reaction is used in such cases that require a high level of energy.

B. Decomposition reaction

A decomposition reaction is one of the common types of reaction that occurs around us, such as the breakdown of NaCl in order to formulate a separate molecule of sodium and chlorine as shown in the figure below [14]. Similarly, the breakdown of water in order to form hydrogen and oxygen is an example of a decomposition reaction. Most of the energy in the decomposing reaction is used in the breaking of a molecule, hence emitting a molecule in the form of energy. Such a reaction requires energy in order to separate molecules [12]. Thus, such reactions are endothermic and have no specific use in energy production.

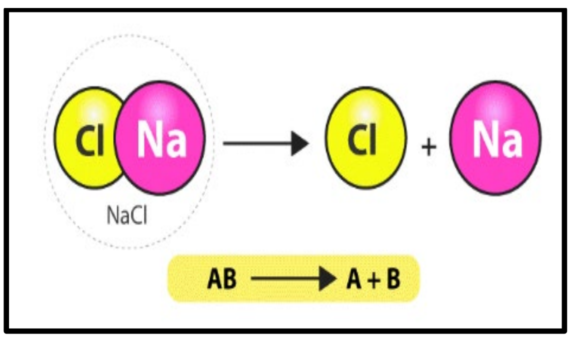

Figure 6: Synthesis reaction

(Source: 12)

C. Combustion reaction

Combustion is one of the most common reactions that produces a vast amount of energy. In such a reaction, the combustion of an element produces a vast amount of energy that can be further transmitted for use. For example, the combustion of methanol or wood alcohol produces energy due to a chemical reaction between methanol and oxygen

$2CH_3OH + 3O_2 \rightarrow 4H_2O + 2CO_2$

On the other hand, combustion of methane is one of the most common combustion reactions that produces water and carbon dioxide, as shown in the reaction below.

$$CH_4 + 2O_2 \rightarrow 2H_2O + CO_2$$

Additionally, such a reaction produces energy [15]. Such a reaction produces a vast amount of energy; however, the product of such a reaction is one of the downsides of the Combustion reaction.

Type of Reaction	Definition	★ Equation
Synthesis	Two or more elements or compounds combine to make a more complex substance	A + B → AB
Decomposition	Compounds break down into simpler substances	AB → A + B
Single Replacement	Occurs when one element replaces another one in a compound	AB + C → AC + B
Double Replacement	Occurs when different atoms in two different compounds trade places	AB + CD → AC + BD

Figure 7: Different reactions of chemicals in energy production

D. Single replacement reaction

For understanding a single replacement reaction, it can be said that such a reaction replaces one element in order to create energy. For such a reaction, the initial elements are always fresh elements that further react to form a new element. For instance:

$$AB(aq)+C \rightarrow A+CB(aq)$$

For the above-mentioned reaction, the C and A are pure elements [18].

E. Double replacement reaction

A double replacement reaction involves two molecules to form an element. Such a reaction is endothermic, hence no external energy is produced in the process [16]. For instance:

$$AB + CD \rightarrow AD + CB$$

Therefore, from the above discussion, it can be understood that synthesis and combustion reactions are one of the most important reactions in order to produce chemical energy that can be further implemented.

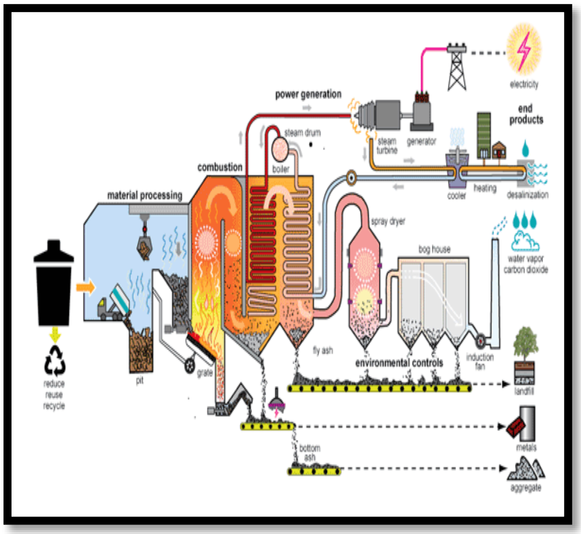

Figure8: Waste to energy transformation

VII. PROBLEM STATEMENT

At the time of the study, the lumped model was described in the form of a mathematical reaction. Therefore, different scopes are viewed according to different variables. It was found that energy creation is directly dependent on the process of homogeneous elements; therefore, the wrong choice of element hinders the process of energy creation [19]. On the other hand, it was found that there are different reactions which produced different amounts of energy, the production of energy is directly dependent on the process of reaction [17]. Thus, one of the major issues for a chemical process energy creation is related to the elements and the process. In order to eliminate any hindrance, the element process and time required should be appropriate.

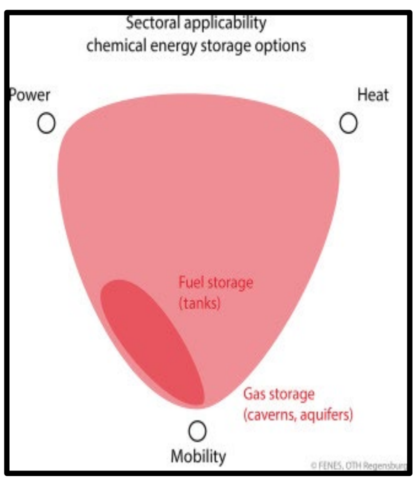

Figure 9: Process of chemical energy storage

CONCLUSION

In order to present an overall understanding of the process of energy creation, the application of different chemical reactions for energy extraction is described. In order to explain the changes according to time, the lump model of reaction is described in the study. Thus, chemical reactions affecting the application of chemical energy are presented in the study. At the same time, a mathematical presentation of the lump model is provided.

REFERENCES

[1] Cao, Y., Weng, M., Mahmoud, M. H. H., Elnaggar, A. Y., Zhang, L., El Azab, I. H., ... & Sheng, X. (2022). Flame-retardant and leakage-proof phase change composites based on MXene/polyimide aerogels toward solar thermal energy harvesting. *Advanced Composites and Hybrid Materials*, *5*(2), 1253-1267.Available at: https://link.springer.com/article/10.1007/s42114-022-00504-4

[2] Chu, Y. M., Nazir, U., Sohail, M., Selim, M. M., & Lee, J. R. (2021). Enhancement in thermal energy and solute particles using hybrid nanoparticles by engaging activation energy and chemical reaction over a parabolic surface via finite element approach. *Fractal and Fractional*, *5*(3), 119. Available at: https://www.mdpi.com/2504-3110/5/3/119/htm

[3] Croft, J. F., Bohn, J. L., & Quéméner, G. (2020). Unified model of ultracold molecular collisions. *Physical Review A*, *102*(3), 033306.Available at: https://arxiv.org/pdf/2005.13148

[4] Ding, S., Hülsey, M. J., Perez-Ramirez, J., & Yan, N. (2019). Transforming energy with single-atom catalysts. *Joule*, *3*(12), 2897-2929.Available at: https://www.cell.com/joule/pdf/S2542-4351(19)30475-1.pdf

[5] Do, D. D., Maneval, J. E., & Rice, R. G. (2023). *Applied mathematics and modeling for chemical engineers*. John Wiley & Sons.Available at: https://www.academia.edu/download/54441640/Applied_Mathematics.pdf

[6] Heazlewood, B. R., & Softley, T. P. (2021). Towards chemistry at absolute zero. *Nature Reviews Chemistry*, *5*(2), 125-140.Available at: https://ora.ox.ac.uk/objects/uuid:4bb0e298-2066-4288-9e7e-c4bf564a7080/download_file?safe_filename=Heazlewood_and_Softley_2021_towards_chemistry_at.pdf&file_format=pdf&type_of_work=Journal+article

[7] Lv, Z., Li, W., Wei, J., Ho, F., Cao, J., & Chen, X. (2023). Autonomous chemistry enabling environment-adaptive electrochemical energy storage devices. *CCS Chemistry*, *5*(1), 11-29.Available at: https://www.chinesechemsoc.org/doi/pdf/10.31635/ccschem.022.202202153

[8] Okino, M. S., & Mavrovouniotis, M. L. (1998). Simplification of mathematical models of chemical reaction systems. *Chemical reviews*, *98*(2), 391-408.Available at:

https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=e91cc422ba7fd6d27301b792408f0e11a0cf7fce

[9] Pandey, P., & Pandey, M. M. (2021). *Research methodology tools and techniques*. Bridge Center.Available at: http://dspace.vnbrims.org:13000/jspui/bitstream/123456789/4666/1/RESEARCH%20METHODOLOGY%20TOOLS%20AND%20TECHNIQUES.pdf

[10] Pelucchi, M., Namysl, S., Ranzi, E., Rodriguez, A., Rizzo, C., Somers, K. P., ... & Faravelli, T. (2020). Combustion of n-C3–C6 linear alcohols: an experimental and kinetic modeling study. Part I: reaction classes, rate rules, model lumping, and validation. *Energy & Fuels*, *34*(11), 14688-14707.Available at: https://pubs.acs.org/doi/pdf/10.1021/acs.energyfuels.0c02251

[11] Puri, P., Mills, M., Simbotin, I., Montgomery Jr, J. A., Côté, R., Schneider, C., ... & Hudson, E. R. (2019). Reaction blockading in a reaction between an excited atom and a charged molecule at low collision energy. *Nature chemistry*, *11*(7), 615-621.Available at: https://par.nsf.gov/servlets/purl/10105061

[12] Ryu, H., Park, J., Kim, H. K., Park, J. Y., Kim, S. T., & Baik, M. H. (2018). Pitfalls in computational modeling of chemical reactions and how to avoid them. *Organometallics*, *37*(19), 3228-3239.Available at: http://pstorage-acs-6854636.s3.amazonaws.com/13106108/om8b00456_si_001.pdf

[13] Toscano, J., Lewandowski, H. J., & Heazlewood, B. R. (2020). Cold and controlled chemical reaction dynamics. *Physical Chemistry Chemical Physics*, *22*(17), 9180-9194.Available at: https://pubs.rsc.org/th-th/content/getauthorversionpdf/D0CP00931H

[14] Vogt, C., Monai, M., Kramer, G. J., & Weckhuysen, B. M. (2019). The renaissance of the Sabatier reaction and its applications on Earth and in space. *Nature catalysis*, *2*(3), 188-197.Available at: https://drive.google.com/file/d/1mjxYV1T6gdIlBugJsaWBZc84iiPzxSv-/view

[15] Wanta, K. C., Astuti, W., Perdana, I., & Petrus, H. T. B. M. (2020). Kinetic study in atmospheric pressure organic acid leaching: Shrinking core model versus lump model. *Minerals*, *10*(7), 613.Available at: https://www.mdpi.com/2075-163X/10/7/613/pdf

[16] Wu, S., Li, T., Tong, Z., Chao, J., Zhai, T., Xu, J., ... & Wang, R. (2019). High-performance thermally conductive phase change composites by large-size oriented graphite sheets for scalable thermal energy harvesting. Advanced Materials, 31(49), 1905099.Available at: https://deepblue.lib.umich.edu/bitstream/handle/2027.42/152740/adma201905099.pdf?sequence=3

[17] Yu, C., Fan, S., Lang, X., Wang, Y., Li, G., & Wang, S. (2020). Hydrogen and chemical energy storage in gas hydrate at mild conditions. *international journal of hydrogen energy*, *45*(29), 14915-14921.Available at:

[18] Zhang, H., Liu, X., Li, H., Hasa, I., & Passerini, S. (2021). Challenges and strategies for high-energy aqueous electrolyte rechargeable batteries. *Angewandte Chemie International Edition*, *60*(2), 598-616.Available at: https://onlinelibrary.wiley.com/doi/pdfdirect/10.1002/anie.202004433

[19] Zhang, Y., Phuong, P. T. T., Roake, E., Khanbareh, H., Wang, Y., Dunn, S., & Bowen, C. (2020). Thermal energy harvesting using pyroelectric-electrochemical coupling in ferroelectric materials. *Joule*, *4*(2), 301-309.Available at: https://www.cell.com/joule/pdf/S2542-4351(19)30634-8.pdf