



Benzene

**CHEMISTRY'S FIRST AROMATIC
BLOCKCHAIN ATOM ECONOMY**

A WHITE PAPER

**By The Benzene Team,
www.benzene.win**

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2. DEDICATION

Dr. Jacob Bigeleisen, an American physical chemist, studied the transformation of crude oil into chemicals. He made significant contributions to understanding the chemistry of petroleum and its products. Unfortunately, he died of acute leukemia in 2010.



The BNZ project is dedicated to the memory and legacy of Dr. Jacob Bigeleisen. The man who greatly contributed to the chemistry of petroleum and its products.

Dr. Jacob Bigeleisen, an American physical chemist, meticulously studied the transformation of crude oil into chemicals. His ingenious work on the kinetic isotope effect has inspired generations of scientists and researchers, and also this project.

Unfortunately, Dr. Bigeleisen passed away due to leukemia in 2010. By dedicating the BNZ project to him, we honor Dr. Bigeleisen's contribution in the field of Chemistry.



3. DEDICATION

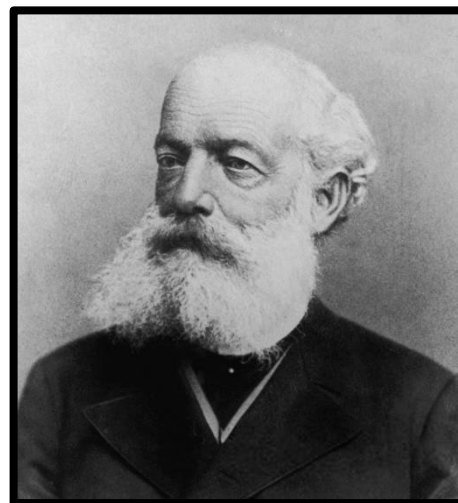
Dr. Friedrich August Kekulé was a visionary chemist, lauded for his profound and intensive contributions to the field of chemistry.

Kekulé's insights and theories proposed the ring structure of benzene, revealing the true nature of aromatic compounds.

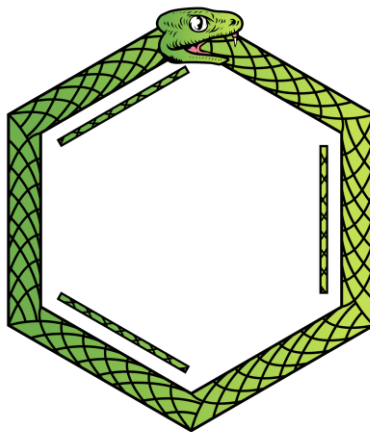
To appreciate the history of Benzene, Kekulé is the man to discuss who described while a lecturer in Ghent University of Belgium, through a daytime dream a snake eating its own tail or an Ouroboros.

He was a genius who understood molecular structures and emphasized the significance of valence and the bonding capabilities of carbon atoms.

Besides his contributions as a chemist, Kekulé also was a highly influential academician and mentor who shaped the future of many others. To him, we dedicate this project.



OUROBOROS – A DEDICATION TO KEKULÉ



4. EXECUTIVE SUMMARY

BNZ is chemistry's first aromatic blockchain atom economy. It is an ERC-20 token that connects aromatics and cryptocurrencies. The token is a peer-to-peer aromatic for chemists, pharmacologists and pharmacists and anyone else in the chemistry field, who despite being an integral part of the industry, do not grow at par with it.

Purchasing BNZ allows you to buy our artwork "Ouroboros" on our website, which can be found listed on our NFT shop. This in turn supports our educational initiative aimed at educating people about the global benzene market which projected to be \$71.5 billion by the end of 2032 (Market.US, 2023). This base chemical is used in many pharmaceutical and non-pharmaceutical products. Benzene can be the first step to understanding the history of organic chemistry and its importance in modern day society.

While pharmaceutical companies like Johnson and Johnson, Roche, and Merck made \$over 60 billion in annual revenues in 2023, the average salary of Chemists in London was between £22,000 and £38,000 or \$27,861 and \$48,123 (Glassdoor, 2024).

BNZ also aims to further research on the sustainable development of benzene, one of the top twenty base chemicals used by the pharmaceutical, textile, and other industries.

By promoting transparency especially in the pharmaceutical sector, it aims to overcome the private pharma companies which benefit from high prices for health insurances in medication. When you buy from a pharmacy the majority of health insurance revenue go straight to pharmaceutical companies however pharmaceutical employees gain less: BNZ replaces cost ineffective health insurance companies whether government based or private with a or peer-to-peer technology. Therefore, removing large corporation middlemen.

BNZ aims to bridge the disparity between professionals like chemists and pharmacists to you and acts as an educational tool, BNZ doesn't distribute profits generated through patents rather profits will impart education for students of organic chemistry and benzene. "Ouroboros" in alchemical traditions refers to the constant battle between construction and destruction in the pursuit of wisdom.



The knowledge you gain from understanding organic chemistry and purchasing the artwork “Ouroboros” helps us research to improve benzene production from crude oil feed and to improve benzene’s atom economy.

Benzene is a base chemical used by several sectors and is one of the top 20 most sought-after base chemicals, so any successful patent in this area is bound to generate high revenues. BNZ dedicates 10% of its patent proceeds to organizations that educate and raise awareness about benzene, aiming to minimize its risks while also leveraging its industrial benefits.

Benzene is produced naturally through volcanoes and forest fires but the extraction and logistical costs make it cost-intensive, and therefore it is produced industrially through a crude oil fragment naphtha.

The BNZ protocol has no sign up, which ensures decentralization known by the team as delocalization. Also, it has a deflationary model and redistributes 10% of profits from the patents to charity for educating organic chemistry.

The protocol charges a percentage of tokens as transaction fee, which increases with the size of the purchase and redistributes those tokens to BNZ Holders.

Benzene is an aromatic and one of the 20 most sought-after base chemicals. It is available naturally, but due to high extraction and logistical costs, it is not preferred.

For over a century, industrial benzene has been produced from naphtha through the Oil to Chemicals (O2C) method. This involves the distillation of crude oil, which creates fractions based on boiling points, one of which is naphtha — a crucial feedstock for producing aromatic hydrocarbons like toluene and benzene.

It is estimated that by 2029, the crude oil demand would peak and there would be a need for output optimization. The R&D BNZ aims to carry out in this area could also generate high revenues through patents. Currently, in the O2C method, the challenge is the development of catalysts that can withstand high boiling points and impurities like metals, nitrogen, and sulfur. BNZ aims to research in these areas and more to bring out patented solutions.



The global benzene market in 2022 was \$39.8 billion, with an estimated 6.2% CAGR (Market.US, 2023). This demand comes from the various drugs and non-pharmaceutical products that utilize this base chemical.

Benzene is crucial for the production of intermediates and active pharmaceutical ingredients (APIs). It enables the production of ethylbenzene, cumene, cyclohexane, and aniline, which are intermediates and used in the synthesis of a wide range of pharmaceuticals.

Overview of Benzene used in drug manufacturing:

- Aspirin (acetylsalicylic acid), antiseptics, and anesthetics use phenols derived from benzene. These markets are collectively valued at over \$40.52 billion.
- Analgesics like paracetamol (acetaminophen) is a \$728.9 million market and uses aniline, yet another derivative of benzene (Market.us, 2023).
- Benzene undergoes sulfation and nitration to produce sulfonic acids used in the manufacture of antibiotics (sulfa drugs), a \$50.91 billion market (Grandview Research, 2024).
- Caprolactam, a derivative of benzene is a precursor for many anti-inflammatory drugs and antibiotics. The anti-inflammatory drugs market alone is worth \$19.57 billion. Beyond drugs, caprolactam is used as a precursor to Nylon 6.
- Benzene is also used to produce antihistamines and antipsychotics, collectively valued at over \$282.3 billion and is estimated to surpass over \$684.74 billion (Future Market Insights, 2024).
- Benzene-derived intermediates are used for the synthesis of vitamins such as K and B. The vitamin market is currently a \$6.7 billion market (MarketsAndMarkets, 2024).

Benzene is also used in the production of herbicides and pesticides, worth \$33.39 billion and \$102.9 billion respectively (The Business Research Company, 2024).

Synthetic fibers such as Kevlar and Dacron use benzene. The synthetic fibers market is over \$66 billion and is expected to surpass \$111.51 billion by the end of 2032 (Reports and Data, 2023). The global dyes and paints market are \$42.64 and \$206.56 billion. These sectors utilize aniline and phenol, which are benzene derivatives (Fortune Business Insights, 2024).



5. INTRODUCTION



BNZ is an ERC-20 token that aims to raise funds to research Oil to chemicals to improve the atom economy of benzene which 10% of profits will be donated to achieve better educational standards.



Benzene (BNZ) is an ERC-20 token that bridges the gap between chemistry and cryptocurrencies. This blockchain project is specifically structured on the lines of a delocalized ring in chemistry, which interconnects without confining it to a single point of control.

The token acts as a medium of exchange, a peer-to-peer token or peer-to-peer aromatic from chemists, pharmacologists and pharmacists and anyone else in the chemistry field. It creates a microeconomy in which stakeholders thrive.

It is designed on the lines of Benzene's chemical structure to create an ecosystem through which stakeholders support a common goal and thrive, while still being independent. Also, it has a powerful protocol that keeps it decentralized through a deflationary model.

Later in this white paper, we shall elaborately discuss the ingenious architecture of BNZ, which makes it chemistry's first aromatic blockchain atom economy — a hyper distributed and interconnected blockchain network designed to ensure transaction security and integrity, while also ensuring efficient resource management.

The token is designed with an intelligent deflationary model where a certain number of tokens are taken out of circulation on each buy, and redistributed to the community, thereby potentially increasing its value. However, there is no promise of profits from other people's work.

This is like atom economy, which when at 100%, makes a product less valuable due to efficient low-cost production. For instance, transitioning to the production of Nylon 6 is considered to be more efficient as crucial ingredients, namely Caprolactam, are used efficiently.

This maximizes resource utilization and minimizes waste — also referred to as atom economy, a green chemistry concept. Likewise, BNZ's deflationary token could appreciate in value through reduction in circulating supply. However, no guarantee is made to anyone.



Through a well-planned protocol, the BNZ is designed to remain truly decentralized. It would be free from the downsides of even the most popular cryptocurrencies like Bitcoin, 40% of which was held by 1000 wallets (Bloomberg, 2017).

As this centralizes holding, it makes decentralization a distant dream and BNZ overcomes this inherent risk at the very threshold, while also achieving its primary goal — a robust atom economy.

As a result, BNZ becomes an ideal choice even for those who want to truly embrace decentralization. The token aims to create a sense of community among the stakeholders, who are typically pharmacists and chemists. The project recognizes the chemistry's fields efforts and creates a community for aromatics.

THE IMPACT

By purchasing BNZ, you get to purchase our artwork called “Ouroboros” on our website, which in turn supports the development of our website, which is primarily dedicated to understanding organic chemistry and our goal is to pioneer discussions around advancing the sustainable development of this crucial chemical.

While BNZ's primary focus is on educating organic chemistry, the project is also determined to tap into the potential of this base chemical, which is crucial for pharmaceutical, textile, and several other industries.

Speaking of pharmaceutical companies, these companies benefit from high prices for health insurances in medication. When you buy from a pharmacy the majority of health insurance revenue go straight to pharmaceutical companies however pharmaceutical employees earn less: BNZ replaces cost ineffective health insurance companies whether government based or private with a peer-to-peer technology, so there are no middlemen.

Overall, the BNZ project creates Chemistry's First Aromatic Blockchain Atom Economy that fosters growth and is free from potential centralization through its inherent architecture.

With this, it taps into the potential of Benzene, a base chemical whose market is projected to be \$71.5 billion by the end of 2032 (Market.US,2023).




As a base chemical, benzene lays the foundation for many pharmaceutical and non-pharmaceutical products and has enormous potential, which we shall discuss in greater detail under the market potential section.

By creating a peer-to-peer exchange token and an ecosystem that advances research and development, BNZ has its goals clearly laid out.



6. WHAT IS BNZ?


BNZ is a peer-to-peer aromatic from chemists, pharmacologists and pharmacists and anyone else in the chemistry field. This token that aims to provide growth to those who are at the bottom of the pharma sector in terms of income due to private pharmaceutical middlemen, despite being the nucleus of the industry.



BNZ is a peer-to-peer aromatic from chemists, pharmacologists and pharmacists and anyone else in the chemistry field to you. Particularly, those who are uneducated who are looking for an unconventional education

While pharmaceutical companies like Johnson and Johnson make annual revenues of \$85.2 billion, Roche \$65.3 billion, Merck \$60.1 billion according to 2023 data, a pharmacist makes much less (Fierce Pharma, 2024). The average annual salary of a Chemist in London is between £22,000 and £38,000 or \$27,861 and \$48,123, which is unfair to a learned community that works relentlessly in the medical sector (Glassdoor, 2024). We as a team will work alongside chemists to work on a research paper to improve benzene's atom economy. The token also aims to provide education to the masses and to become a resource to appreciate the history of Benzene, which Kekulé described through a dream originally as a snake eating its own tail or an Ouroboros.

While pharmacists and chemists keep their knowledge within universities BNZ aims to be an outreach program to encourage educational learning and is a tool to bring the average person up to speed with organic chemistry. To change the status quo, we introduce Benzene.



The community-centric approach aims to promote scientific research and discussion around the atom economy and provide a growth avenue for the stakeholders in the long run and build more use cases for the token to increase adoption and for education to be improved for all.

It has a cleverly designed protocol that overcomes the downsides of even the Bitcoin protocol and truly embraces decentralization. BNZ has no signup or counterparty risk and we shall discuss this more elaborately in the protocol section.

This blockchain project is specifically structured on the lines of a delocalized ring in chemistry, which interconnects without confining it to a single point of control.



We also use the phrase "Atom Economy" to demonstrate efficiency and sustainability, indicating that BNZ aims to promote efficiency by focusing on reducing waste and optimizing resource usage through research and development.



7. THE PROTOCOL

The BNZ is a trustless protocol that entirely functions through smart contracts with no manual intervention. To facilitate this, the Ethereum blockchain was chosen because it is the most credible chain with smart contract functionality, unlike its predecessor, Bitcoin. Since it is an ERC-20 token, it can be stored on compatible private wallets by the stakeholders.

The BNZ protocol has the following features:

7.1. TRUSTLESS OPERATIONS

The BNZ protocol is entirely automated using smart contract code which is available publicly and can be verified. There is full transparency, with absolutely no room for centralization.

7.2. DEFLATIONARY MODEL WITH REWARDS

Akin to the atom economy in Nylon and Kevlar, Nylon has a higher atom economy and so the wastage and price to the consumer or number of BNZ goes down, wherein lots of atoms decrease Nylon's value.

In comparison, Kevlar has a lower atom economy and so the wastage and price to the consumer or number of BNZ goes up, wherein fewer atoms increase Kevlar's value.

With that said BNZ token's price could increase over time. That's because the protocol is designed with a deflationary model which means, over time, instead of decreasing in value due to oversupply, the BNZ tokens could increase in value due to shrinking circulation and redistribution in the form of rewards.

7.3. NO SIGN UP

Although decentralization has been the core idea behind cryptocurrencies, it has to a large extent been centralized by the exchanges which require KYC and other formalities, but BNZ overcomes that at the very threshold by eliminating the need to sign up with an exchange as the BNZ token can be purchased straight from the website.



BNZ is a trustless protocol, with no sign up. It has a deflationary model and redistributes 10% of profits from the patents to charities who improve educational standards of especially the youth.



7.4. ANTI-WHALE

The BNZ protocol is anti-whale because it encourages smaller investments through a cleverly programmed protocol that charges a transaction fee on the purchases based on its size, which we shall discuss in detail in the tokenomics section.

This 'fee' deducted from the tokens purchased is then removed from circulation and redistributed to the community. While it rewards the community, it also encourages small investors. Also, there is a security feature to prevent wallets from amassing huge quantities in order to protect the ecosystem from flash loan attacks and the organized pump and dumps.

7.5. PROTOCOL DESIGN

The BNZ protocol is designed to encourage small buyers to invest more, and this is achieved through volume-linked transaction fee collected from the buyer.

As shown in the table below, the transaction fee is a percentage of the tokens purchased (atom economy) and the tokens wasted are then redistributed and burnt.

TOKENS PURCHASED	TOKENS RECEIVED	TOKENS WASTED OR REDISTRIBUTED & BURNT
Less than 1 million	100%	0%
1 to 10 million	99%	1%
10 to 100 million	98%	2%
100 million to 1 billion	97%	3%
1 to 10 billion	96%	4%
10 billion to 78,110,000,000	95%	5%

The protocol along with the tokenomics ensures absolute decentralization while also benefiting the community.



8. TOKENOMICS

Let us now discuss the BNZ token's economics to understand how this token ensures equitable and fair distribution, while also keeping the platform decentralized.

TOTAL SUPPLY:

The total supply of BNZ was 78.11 billion and this hard cap was to ensure limited supply, which hedges against inflation.

TRANSPARENCY AND GOVERNANCE:

BNZ is 100% decentralized and the protocol is embedded into a smart contract for trustless operations. To keep it decentralized, the project does not make any reserves for founders, team, or treasury.

DEFLATIONARY MODEL:

BNZ has a deflationary model embedded into its protocol and as we have already discussed, a percentage of the tokens bought is burnt to the community. This controls inflation and could pave the way for value appreciation.

REDISTRIBUTION MECHANISM:

The tokens taxed or wasted during a purchase are redistributed to the community, again through a smart contract, which ensures there is no centralizing of resources or misappropriation as is the case when a project creates multiple internal wallets for founders.

REVENUE SHARING:

BNZ is a utility token meant to support research and development of professional chemists and therefore, chemists will work on our project to find a more atom efficient benzene through O2C or Oil-To-Chemicals, moreover, 10% of the profits from the patents created would be given to charity to improve education to the wider community. Furthermore, the shrinking supply could also increase BNZ's value and thereby benefit the community. Although charity is important, that is just one facet of BNZ. The other is its shrinking supply which could create scarcity and enhance BNZ's value and thereby benefit the community. However, BNZ does not make any promise of profit and price is based mostly on supply and demand.



9. WHAT IS BENZENE

The BNZ project revolves around benzene, making it essential to discuss this base chemical's composition and manufacturing process. This provides a clearer picture of the potential for research in this area.



Benzene is an aromatic and one of the 20 most sought-after base chemicals. It is available naturally, but due to high extraction and logistical costs, it is not preferred.



A WORD ABOUT BENZENE

Benzene's chemical formula is C_6H_6 and it comes from naphtha, one of the fractions derived from crude oil refining. Benzene is one of the aromatics that can be produced using naphtha and is a base chemical used by many sectors, which are elaborately discussed in the market potential section.

Benzene is called an aromatic because of its chemical structure. As all the carbon atoms lie in the same plane, allowing effective overlapping of p-orbitals. Its carbon atoms tend to form a ring and have alternating single and double bonds.

The electrons in these bonds are however fragmented or delocalized over the ring, and not fixed, which results in a conjugated π -electron system. It thereby follows a specific rule (Hückel's rule) for stability with 6 π -electrons and has equal bond lengths.

It is primarily an organic chemical compound that evaporates quickly, besides being highly flammable. Although mostly colorless, sometimes benzene can have a light yellowish hue. Commercially, benzene is one of the top 20 industrial chemicals. We shall now discuss how it is produced and the challenges in doing so.

Natural Benzene

Benzene is naturally produced due to volcanoes and forest fires, however, extracting benzene from natural sources is cost intensive. Besides the extraction cost, the logistical inconvenience also makes it impractical.

For example, a forest fire could occur in a remote location while the manufacturing facilities are several thousand miles away. Therefore, businesses prefer to rely on industrially produced benzene.





Benzene is produced from naphtha, which is produced during the crude refining process.

As crude oil demand is projected to peak in 2029, R&D to optimize output essential.



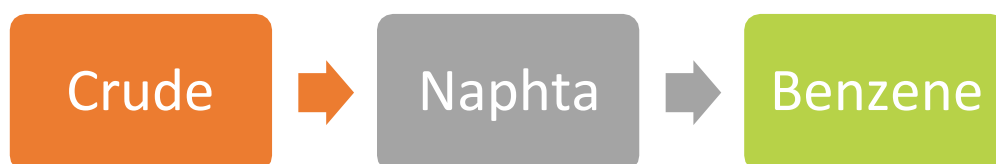
Industrially Produced Benzene

Industrial benzene, like most other base chemicals such as ethylene and propylene, is produced through a refinery process known as the Oil to Chemicals (O2C) method.

For almost a century, industrial benzene has been produced in this manner. It begins with the distillation process wherein the crude oil is heated. This process separates crude into various fractions based on boiling points.

One of these fractions is naphtha, which is a key feedstock used in the production of aromatic hydrocarbons like toluene and benzene and that is where the problem lies.

Crude oil demand is rising each day and is expected to peak by 2029, increasing the need for highly productive chemical extraction processes that can optimize the output (BBC, 2023).



In the O2C method, the biggest roadblock is the formulation of catalysts that can efficiently tolerate the feed's high boiling point and continue to do so throughout large-scale production. An improved efficiency of a catalyst in turn improves the atom economy of Oil to Chemicals process.

This can be marred if impurities are present in the feed, such as metals, nitrogen, sulfur, etc... To overcome this, extensive research is required and BNZ aims to do that and create patented products and/or processes.

Through some chemist's intensive research, we figured out that the zeolitic components of the catalyst degradation can be checked through formulation. An improved efficiency of a catalyst in turn improves the atom economy of the oil to chemicals process.



Also, it was observed that the metal deposition leads to a slight reduction in activity and induces certain changes in selectivity patterns. These alterations are thoroughly examined through extensive characterization.

However, with growing concerns about environmental awareness and the expanding markets for eco-friendly engines (electric, hybrid, or hydrogen-powered), there is a consensus that the fuel market will decline over time.

The UK and several other European nations have already implemented public electric vehicles, to achieve their zero-emission goals (The UK Government, 2024).

While the crude requirements may experience decline in that direction, the chemical market still has potential and BNZ aims to tap into it through benzene. Let us now elaborately discuss the potential of this market.



10. MARKET POTENTIAL

The global benzene market was valued at \$39.8 billion in 2022 and is growing at a steady 6.2% CAGR (Market.US, 2023). This growth stems from its many applications, which are listed below:

10.1. PHARMACEUTICAL MANUFACTURING

Benzene is a base chemical used in drug manufacturing and acts as a building block in the synthesis of several pharmaceuticals. Benzene plays a pivotal role in the production of intermediates and active pharmaceutical ingredients (APIs).

Let us now discuss some of the uses of benzene in drug manufacturing to understand why any research carried out on this chemical could be highly productive in the long run.

10.1.1. Precursor to produce other chemicals

Benzene enables the production of other crucial chemicals such as ethylbenzene, cumene, cyclohexane, and aniline. These chemicals are intermediates and essential for the synthesis of a wide range of pharmaceuticals.

10.1.2. Phenol Production

By using cumene, benzene is transformed into phenol, which is an essential starting material for the synthesis of several drugs. A few to mention are aspirin (acetylsalicylic acid), antiseptics, and anesthetics.

In the year 2023, the aspirin market was worth \$2.47 billion and is steadily growing at a 4.9% CAGR. The antiseptic drug market is much larger and is estimated to be worth \$79.25 billion in 2033 from \$28.75 billion in 2022, which is at 10.67% CAGR (Yahoo Finance, 2024).

The anesthetics market in 2023 was valued at \$9.3 billion and is estimated to grow at a 6.1% CAGR (The Business Research Company, 2024). That gives a fair idea of the significance of benzene.

The Pharma sector uses benzene and its derivatives in the manufacturing of drug types with large markets such as antiseptic drugs worth over \$28.75 Bn, anesthetics over \$9.3 Bn, and aspirin worth over \$2.47 Bn.





Benzene is also used to produce antihistamine worth \$263.9 billion, antibiotics \$50.91 Bn, Vitamins \$6.7 Bn and paracetamol worth over \$728.9 Mn.



10.1.3. Synthesis of Aniline

Yet another use of Benzene is Aniline, which is derived from benzene. It is used to produce analgesics such as paracetamol (acetaminophen). In the year 2023, the global paracetamol market was around \$728.9 million and is growing steadily at a 4.1% CAGR (Market.us, 2023).

10.1.4. Sulfonation and Nitration Reactions

Benzene is also used in the manufacture of antibiotics (sulfa drugs) which in 2023 was valued at \$50.91 billion and is estimated to grow at a 4.2% CAGR (Grandview Research, 2024).

To facilitate the manufacture of antibiotics, benzene undergoes the sulfonation and nitration processes. This produces sulfonic acids and nitrobenzenes, compounds that are further processed into sulfa drugs or other drugs.

10.1.5. Chlorobenzene

When chlorinated, benzene produces chlorobenzene, which is used to manufacture diazepam and other sedatives. The inhalation sedatives market alone was valued at \$2.03 billion in 2022 and is estimated to surpass \$2.43 billion by 2026 (Yahoo Finance, 2023).

10.1.6. Cyclohexane

Cyclohexane, which is also derived from benzene produces caprolactam, which acts as a precursor to the polyamide Nylon 6. In the year 2022, the synthetic fibers market was valued at \$66 billion and is expected to surpass \$111.51 billion by the end of 2032 (Reports and Data, 2023).

10.1.7. Pharmaceutical Intermediates

Benzene derivatives like toluene and xylene play a crucial role in the production of antihistamines and antipsychotics. The increasing number of allergens and the failing resistance has created an enormous micro-segment within the pharmaceutical sector.

The antihistamine drug market in 2022 was worth \$263.9 billion and by 2033 is estimated to be around \$647.7 billion (Future Market Insights, 2024). On the other hand, the antipsychotics is estimated to be a \$37.04



billion market by 2032 from its current \$18.04 billion in 2023 (BioSpace, 2024).

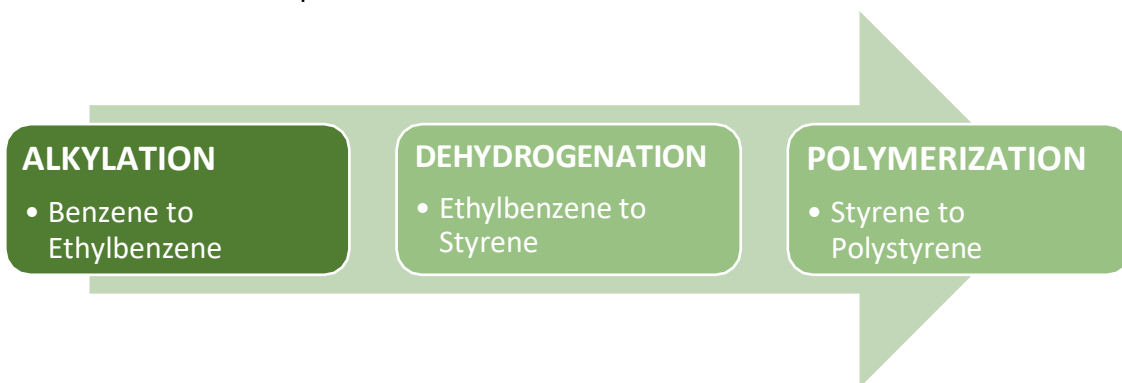
10.1.8. Polystyrene

Polystyrene, commonly used to manufacture plastics, insulation, and packaging material for fast-moving consumer goods, is produced from benzene.



It has a \$9.57 billion dollar market and is produced from Benzene through a chemical synthesis process (Fortune Business Insights, 2024).

Let us now discuss this process.



1. BENZENE TO ETHYLBENZENE VIA ALKYLATION:

Reaction: Benzene reacts with ethylene to form ethylbenzene when catalyzed. Usually, by a Lewis acid such as aluminum chloride (AlCl_3) or a zeolite catalyst.

Description: In this alkylation reaction, ethylene combines with benzene, forming ethylbenzene.

2. ETHYLBENZENE TO STYRENE VIA DEHYDROGENATION:

Reaction: Ethylbenzene is then dehydrogenated by using steam and a catalyst such as iron oxide or potassium oxide, and this forms styrene.

Description: Ethylbenzene loses hydrogen atoms during the dehydrogenation process to form styrene.

3. STYRENE TO POLYSTYRENE VIA POLYMERIZATION:

Initiation: By using free-radical initiators like benzoyl peroxide or azobisisobutyronitrile (AIBN), the polymerization of styrene begins.

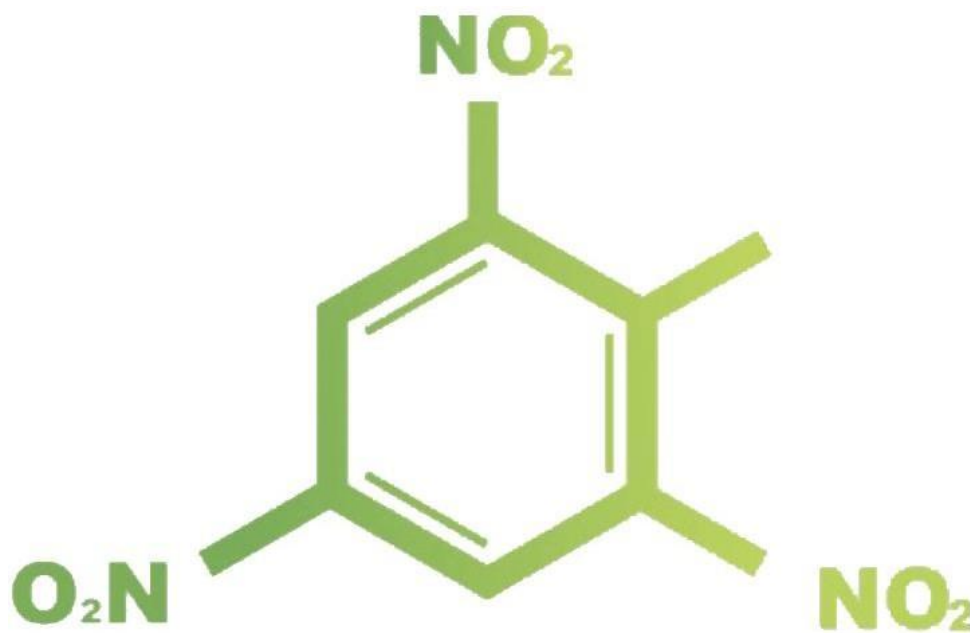
Propagation: During polymerization, styrene monomers react and form long polymer chains.

Termination: The reaction is terminated when free radicals combine, resulting in the formation of a stable polymer chain.

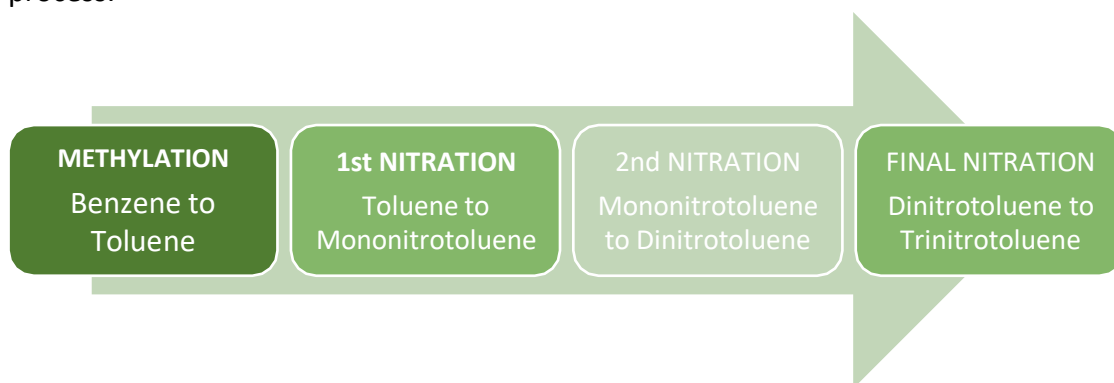


10.1.9. Trinitrotoluene

Trinitrotoluene (TNT) is yet another compound derived using benzene. It is mainly used in explosives, but it is also used in manufacturing chemicals for dye and photography industries.



TNT is produced from benzene through the following chemical synthesis process.



1. BENZENE TO TOLUENE VIA METHYLATION:

Reaction: Benzene and methyl chloride (CH₃Cl) reaction is triggered using a catalyst, such as aluminum chloride (AlCl₃). This forms toluene.

Description: The methylation reaction from methyl group (CH_3) being combined with benzene produces toluene.

2. TOLUENE TO MONONITROTOLUENE VIA NITRATION:

Reaction: Toluene reacts with a nitrating mixture of concentrated nitric acid (HNO_3) and sulfuric acid (H_2SO_4) to form mononitrotoluene.

Description: In this nitration reaction, a nitro group (NO_2) is added to the toluene molecule, typically resulting in the formation of ortho- and para-nitrotoluene.

3. MONONITROTOLUENE TO DINITROTOLUENE VIA SECOND NITRATION:

Reaction: A second nitration is triggered by combining Mononitrotoluene with concentrated nitric acid and sulfuric acid. This forms dinitrotoluene.

Description: The Mononitrotoluene molecule along with nitric acid and sulfuric acid produces dinitrotoluene.

4. DINITROTOLUENE TO TRINITROTOLUENE VIA FINAL NITRATION:

Reaction: Dinitrotoluene further undergoes a third nitration reaction with concentrated nitric acid and sulfuric acid to form trinitrotoluene (TNT).

Description: The nitration of dinitrotoluene molecule results in the formation of trinitrotoluene.



Agrochemicals and Synthetic Fibers manufacturing requires Benzene. Together, these are worth over \$247 billion.



10.1.10. Vitamin Synthesis

Benzene-derived intermediates also play an important role in the synthesis of vitamins such as K and B. The vitamin market is estimated to grow from \$6.7 billion in 2023 to over \$8.9 billion in 2028 and the key drivers are increasing health awareness and disposable income (MarketsAndMarkets, 2024).

10.2. AGROCHEMICALS AND OTHER SPECIALTY CHEMICALS

Benzene derivatives also aid in the production of agrochemicals such as herbicides and fungicides. Agrochemicals is yet another huge market and in 2023, the herbicides market was valued at \$33.39 billion, while pesticides was around \$102.9 billion (The Business Research Company, 2024).



10.3. SYNTHETIC FIBERS

In the year 2022, the synthetic fibers market was valued at \$66 billion and is expected to surpass \$111.51 billion by the end of 2032 (Reports and Data, 2023). Many fabrics such as Nylon and Kevlar use benzene.

However, the difference in their atom economies gives them unique properties. For example, Nylon has a 100% atom economy and is used in making bags and is the cheapest potentially due to little wastage due to high atom economy.

Next comes Kevlar with 77% atom economy and is ideal for high-stress applications like army, police uniforms, and even marine composites such as sails, propellers, and hulls. Which is more expensive potentially due to lots of wastage and a lower atom economy.

10.4. PAINTS AND DYES

Aniline and phenol, derivatives of benzene, are used in the manufacture of paints and dyes, two multi-billion-dollar industries. In the year 2023, the global dyes market was valued at \$42.64 billion, while the paints and coatings market were at \$206.56 billion (Fortune Business Insights, 2024).

From the above stated diverse applications of benzene, it is clear that this base chemical has a strong future demand. By supporting research in this direction, BNZ holders could earn rewards in the form of redistribution and support educational opportunities for up-and-coming chemists who are just beginning their journey.

The global dyes and paints market make use of aniline and phenol, which are benzene derivatives. These industries are worth \$42.64 and \$206.56 billion.



11. CONCLUSION

BNZ is a blockchain initiative that is structured closely on the principles of a delocalized ring in chemistry, interconnecting without confining control to a single point. This ingenious project bridges the worlds of chemistry and blockchain technology by introducing BNZ, an innovative ERC-20 token.

BNZ operates on a peer-to-peer model, with absolutely no sign-ups required, thereby eliminating middlemen and associated risks such as price manipulation. This design ensures better user control over assets, preventing losses to scams. BNZ's decentralized approach, together with its deflationary model, position it as a futuristic solution in the evolving landscape of blockchain and chemistry.

The initiative's commitment to research and development in Oil to Chemicals (O2C) processes aims to optimize benzene production from crude oil, by focusing on improving atom economy and developing resilient catalysts. These advancements can significantly enhance production efficiency and reduce costs. A primary goal of BNZ is to develop a reusable catalyst within the reactions of crude oil to chemicals, promoting sustainability in crude oil manufacturing.

At this juncture, it is crucial to clarify that BNZ is a utility token and can be used to purchase our artwork named Ouroboros on our NFT shop. The project aims to educate crypto users about organic chemistry. Education is a cornerstone of BNZ's mission. Despite the wealth of knowledge in the chemistry field, it often remains inaccessible to the average individual. BNZ addresses this issue by donating 10% of profits from successful patents to improve educational standards.

In essence, BNZ serves as an educational tool, enhancing knowledge in both the chemistry and cryptocurrency communities. By empowering individuals with education and innovative solutions, BNZ is paving the way for a more informed and sustainable future.



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