Top Reasons Why Corrosion Inhibitors Are Important and What They Do

WHITE PAPER



Corrosion is a universal issue worldwide, and several studies have been conducted on corrosion factors and how they affect a product's durability and finish, with estimated costs ranging between 2% to 3% of GDP per annum for certain countries. Recent studies suggest that these effects are much more prominent than initially thought.

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Corrosion inhibitors are vital for the Oil and Gas Production and Manufacturing industries. The use of corrosion inhibition has always been regarded as the first line of defense against corrosion, and a good number of scientific studies have been dedicated to the issue of corrosion, with most conclusions drawn from trial-and-error experiments, both in the laboratories and the field. The use of corrosion inhibitors to decrease the rate of corrosion processes is quite diverse by creating a cost-effective product for pipeline transport in the oil and gas industry.

In the pages of this White Paper, we will explore corrosion inhibitors and their types, uses, and importance in various industries. Conclusion

References

Historical Background of Corrosion Corrosion is a universal phenomenon that is ubiquitous and omnipresent because it is found everywhere, in the air, water, and soil. Corrosion is an undesirable condition that destroys the delicately polished coatings of materials such as gold, silver, and platinum alloys and lessens their lifespan.

The Indian government spends around 4%

Definition: Corrosion Inhibitor

A corrosion inhibitor is a chemical often used in conjunction with other chemicals or as a standalone product to slow down the rate of corrosion on surfaces that come into contact with water, sulphuric acid, or other chemicals containing salt. <u>Corrosion inhibitors</u> are commonly used around areas such as in industrial surroundings where corrosive chemicals and minerals are common, but

of national income per annum to prevent corrosion from occurring in any shape or form. Studies have shown that many nations also spend loads of money yearly to keep deterioration at bay.

Corrosion Control Methods

There are several methods to choose from depending on the material you want to protect, such as organic or metallic coatings, you could also use corrosion-resistant plastics or polymers, and there's always cathodic protection, a technique used widely in the oil and gas industry to prevent things like pipelines, storage tanks, or offshore structures from rusting over time! consumers also know them due to their presence in over-the-counter products such as soaps and shower gels.

A corrosion inhibitor is a compound used to decrease the rate at which something corrodes. When a corrosion inhibitor is added to water, it stops the water molecules from easily bonding with the oxygen atoms in stainless steel and thereby stops them from forming into larger compounds! This might be metal or other

One of the best methods of preventing corrosion is by using inhibitors, which are inexpensive and effective. In fact, there is research that shows how extensive use of inhibitors in a variety of industrial processes has prevented serious damage to property and the environment as a whole. Inhibitors have stood the test of time regarding safeguarding public safety, preventing damage and degradation, and saving both money and resources worldwide.

material.

Corrosion inhibitors can primarily be used inside water tanks in combination with lubricants and sometimes even other chemicals to protect homes from weathering damage that may result from rain or other types of precipitation intake.

Types Of Corrosion Inhibitors

Corrosion inhibitors can be added to whatever

liquid needs inhibiting so that it does not corrode metals and materials from within. Corrosion inhibitors can be classified into four general types and what conditions they work under depending on their use!

1. Anodic Inhibitor

These types of inhibitors form a thin layer on the surface of the metal, which blocks oxygen from attacking the metal. This reaction leads to a significant anodic shift, turning the metallic surface into a passivation area that helps reduce the corrosion potential of the material. Some examples of anodic inhibitors include chromates, nitrites, orthophosphates, and molybdates. Morpholine and Hydrazine are some of the examples of VPIs. Morpholine works in boilers by lowering the amount of phosphate in the external atmosphere to not more than ten ppm below the saturation temperature of 100 degrees C. In contrast, Hydrazine works by adjusting the pH acidity level to less than five at 100 degrees Celsius using a buffer solution containing NaOH (simplified sodium hydroxide).

2. Cathodic Inhibitors

Cathodic inhibitors are used to either slow the reaction down or to prevent an element from being eroded. Examples include sulfite and bisulfite ions, which react with oxygen to form sulfates. Another method includes nickel's catalyzed redox reaction, which involves reducing ions like chloride into metals.

Uses of Corrosion Inhibitors

Corrosion Inhibitors protect metals from rust and prevent them from electrolytic corrosion. Corrosion inhibitors are generally used to stop the rusting and anodic corrosion of metals. These chemicals, which generally form a thin protective layer on the metal's surface, can be made from chromium or zinc. Listed below are some of the uses.

3. Mixed Inhibitors

Corrosion Inhibitors are primarily used in industrial settings due to the high levels of corrosive salts found there but are also regularly employed in household applications for protecting appliances such as boilers.

The mixed Inhibitors form a film on the metal surface. The reactions caused by these inhibitors are of two types: anionic and cationic reactions. These reactions help to prevent the formation of rust on the metal surface. This is done via the formation of a precipitate on the surface of the metal. Silicates and phosphates are the two types of mixed inhibitors that work as water conditioners in order to stop rusting of water.

The coatings of the metal surface with a chromate layer can prevent rusting. They are very effective in stopping anodic corrosion as well. Oxygen scavengers can be used as a method for coating these surfaces, and it helps

4. Volatile Corrosion Inhibitors

Volatile corrosion inhibitors can be very useful for BOPs (boilers, oil refineries, and petrochemicals). It can be used to eliminate corrosion in condenser tubes found in boilers. These are also known as vapor phase inhibitors or VPIs for short. keep the environment oxygen-free so that there's no chance for cathodic corrosion to occur.

Corrosion inhibitors, or CIs for short, are used to prevent all sorts of corrosion that affect metals. Most often, Corrosions Inhibitors are used earlier on during the production process of the product so that they can be applied to items before they are finished and put into use. One example is cars; if you want your car to retain its physical appearance and appear as good as new throughout its lifespan, it is essential to apply a protective layer of Corrosion Inhibitors onto all parts which might be vulnerable, like wheels or frames.

Corrosion inhibitors are one of the several different preventative methods used to slow down or stop chloride in concrete mixing. Corrosion inhibitors help delay or stop corrosion in the pre-cast concrete by actively reducing the reaction between the mix, cement, and water. also anti-corrosion compounds, passivation agents, and cathodic protection systems. Investment in corrosion inhibitors during their maintenance phase can benefit a range of industries based on the performance boost they offer.

Corrosion inhibitors help to save you money on refurbishing and replacing equipment that otherwise would have been corroded away by liquids containing acidic substances. Corrosion inhibitors play an important role in minimizing metal loss; this can reduce the useful life of heat exchangers, recirculating water piping, and process cooling equipment.

Corrosion inhibitors have many uses, especially in the business world. For example, they are commonly used to inhibit rusting and other forms of corrosion within the porcelain bathtub industry. This use is accomplished by adding a chromium oxide layer to the metal surface, which prevents further rusting and other forms of corrosion from happening over time. Oxygen scavengers can be utilized as CIs. For example, if you're looking for a CI that prevents corrosion in small parts or instrument housing, this will most likely be the choice you need.

Corrosion inhibitors can be added to water systems to reduce the amount of metal loss from the piping, tubes, or equipment, and maintaining this kind of application can help reduce contamination, clogging, and failure.

When choosing a corrosion inhibitor, there

Factors To Consider While Selecting Corrosion Inhibitors

Selecting a corrosion inhibitor is an important step to keep in mind because they happen to come in various forms, but it's worth the effort. Selecting the right corrosion inhibitor depends largely on your application and performance requirements. When you are investigating this product, we think that it's important to know about the broad categories of inhibitors as well

as which ones can be used for specific applications and industries.

are a number of factors to look out for. First among these is the fact that most corrosion inhibitors are made from various chemicals intended to interact with metals and prevent corrosion.

Importance of Corrosion Inhibitors Corrosion inhibitors inhibit the oxidation of certain metals, such as iron. In some instances, the primary function is to eliminate "rust." Corrosion inhibitors are

The best approach in selecting a corrosion inhibitor would be to start off by reviewing some of the search results that come up when you search for them online. Next, it might be a good idea to consult an expert who has experience making these inhibitors or who at least patented technologies that use of them.

Also, consider how often your system might be exposed to factors such as metal ions in the water or general wear and tear. Is it a temporary situation where you'll need a quick solution until you replace a certain part? Or would you prefer one that will last years beyond that? In sum: Keep these factors at the top of your list before deciding which corrosion inhibitor to use.

Consider the external environment, the weather conditions, and exposure to heat or cold of the metals being handled. How much handling is done by machine? Consider that machinery may benefit from protection against corrosion, such as one will apply to a product such as an automobile part. Corrosion inhibitors should be environment friendly.

Corrosion Inhibitors Market Report The global <u>corrosion inhibitor market</u> is estimated to be worth USD 9.3 billion in 2021 and is projected to reach USD 10.1 billion at a CAGR of 4.7% between 2022 and 2027. There's a considerable amount of demand for corrosion inhibitors from various end-use segments, along with aggressive regulations and sustainability requirements related to the environment that are spurring the demand for

Applications of Corrosion Inhibitors

corrosion inhibitors.

The corrosion inhibitor market has been studied with regard to five major regions, viz. North America, Europe, Asia-Pacific (APAC), Middle East & Africa (MEA), and South America (SAM). This corrosion inhibitor industry report provides a holistic view of the global market along with technological advancements being practiced by the leading players in this field for various applications in the Aviation Industry,

Corrosion inhibitors can be applied to many different surfaces in order to stop corrosion and damage done to those surfaces. The removal of scale from metal surfaces using hot acid solutions is often necessary for manufacturing processes. Metal oxide scales are a byproduct of many commercial processes, including those used for the GE Water production of clay, dyeing fabrics, and mixing AkzoNobel metals used for making pipe.

Oil & Gas sector, Power Generation and Infrastructure Segment, etc.

Corrosion Inhibitor Key Market Players Major players operating in the global corrosion inhibitor market include

BASF SE (Germany)

Cortec Corporation

Ecolab

To minimize the percentage loss of metal when removing these opaque substances, various compounds such as alcohols made from acetylene, indoles, and others are added because they help to dissolve oxides better than pure acids alone.

Solutia Inc

Corrosion Preventive Strategies

Prevention applies not only to metal pipes but also to oxygen sensors since some cars need them to operate effectively. Corrosion prevention saves money on the cost of materials and helps the environment by preventing damage to property and public safety. It also prevents corrosion-induced equipment failures that can cause injuries (e.g., hand or finger amputation). Because metal tends to corrode through these discretions over time, this form of corrosion is more likely if one stores them together rather than in separate containers.

Cathodic Protection

Preventing corrosion is vital for the functionality of your product. There are a number of methods with which you can do so, some more complex than others. You can use an impressed current made by an outside course to overpower a corrosive current on the inside by applying a small electrical current to the surface of any metal part, thereby preventing reactions that lead to the corrosion of a structure. Alternatively, if that doesn't suit your needs, you could try using sacrificial anodes to protect products under the threat of corrosion.

Design

Corrosion control begins at the project planning stage. If the product is intended for use in harsh environmental conditions that are susceptible to corrosion, product developers should design the part so that it would be less susceptible to corrosion. To reduce crevice corrosion and other forms of corrosion, designers should avoid designing parts with narrow gaps that allow air or fluid to enter and become stagnant.

Sacrificial anodes are commonly used in industrial environments to keep any products protected at all times as these provide a source that will repel any form of hydrogen and dissolve it before it harms the structure, thus preventing any form of rust or other general deterioration in your product's coating. They are usually incorporated into electroplating and galvanizing operations wherever efficiency and cost-effectiveness are a concern.

Environmental Control

Corrosion can happen if certain environmental factors are present. It's important to store metal parts in a clean, dry environment where they won't collect dirt or rust when not in use. If you plan on storing your metal for a long period of time, it may be helpful to check with an expert engineer that can advise you on the best way to control their

environment so as not to cause corrosion from factors like humidity and moisture, also make sure to use methods that control sulfur levels or chloride levels in the surrounding air.

Corrosion that occurs due to contact between two different metals with disparate electrode potential differences is referred to as galvanic corrosion.

Maintenance

One very effective way of protecting your metal parts from corrosion is by installing coatings and protective covers onto them. But even the best coatings may degrade over time, and small defects can cause significant issues with leaks or corrosion. It is worth noting that these coatings, no matter how effective they may be, are nothing without the right maintenance plan. Cleanliness plays an important role in this as it removes contaminants that could otherwise cause damage or discoloration to the coating. Concentrating on prevention will save money in the long run by keeping your machinery running smoothly and longer.

Frequently Asked Questions About Corrosion Inhibitors 1.Which Inhibitor Is Used In Metal Protection? Inorganic substances such as phosphates, chromates, dichromates, silicates, borates, tungstates, molybdates, and arsenates have been found effective as inhibitors of metal corrosion. Pyrrole and derivatives are believed to exhibit good protection against corrosion in acidic media. Silicates will slow down acidic deterioration, while phosphates work better on alkaline corrosion due to their highly charged reaction in abnormal environments such as your favorite project's ecosystem!

Conclusion

Corrosion has a significant influence on the environment and the economy, as well as on the construction industry. A lot of bridges, buildings, chemical processing units (CPU), waste-water treatment facilities, highways, and other infrastructure objects made with metals are affected by corrosion. The direct costs attributed to corrosion reach many billions of US dollars worldwide every year. In addition to material loss, corrosion interferes with human safety and industrial operations and can cause severe damage. So timely and appropriate control measures must be implemented to stop such processes from

occurring or recurring.

2. What Type Of Inhibitor Reduces Corrosion?

Anodic corrosion inhibitors. This type of inhibitor parks itself on the surface of the metal, creating a protective layer that blocks corrosion from progressing further by keeping all corrosive elements away from your product and, in turn, reducing the corrosion potential that comes from contact with water, and salt water, etc. The protective film is formed without sacrificing any properties, which makes this a good option if you want to preserve the integrity of your metal while also providing some protection against corrosion.



3. What Are The Most Common
Corrosion Inhibitors?
There are two main inhibitors when it comes
to corrosion, silicates, and phosphates.

The key to corrosion prevention and control is to be aware of and take preventative measures, One way of inhibiting the corrosion of a thing would be to coat the surface of the said thing, either with paint or something else that prevents contact with substances, such as water in this case, from reaching its surface and hence keeping it clean and new for longer!

At GZ Industrial Supplies, we are committed to delivering the most efficient and effective anti-corrosion solutions in Nigeria. We provide unparalleled service to clients through our state -of-the-art equipment and modern implementation of industry-standard technologies. We want all of our clients to know that our anti-corrosion service is second to none.

Our superior corrosion protection solution is available in a matter of hours and can fully protect your vulnerable surfaces. If you're looking for corrosion protection services in Nigeria and have questions about our certified coating applicators, or if you just want a <u>custom quote</u> for your exact application, <u>contact us</u> or email us at info@gz-ind.com.

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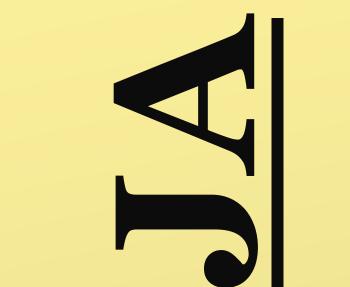
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WHERE TO BUY CORROSION INHIBITORS IN NIGERIA

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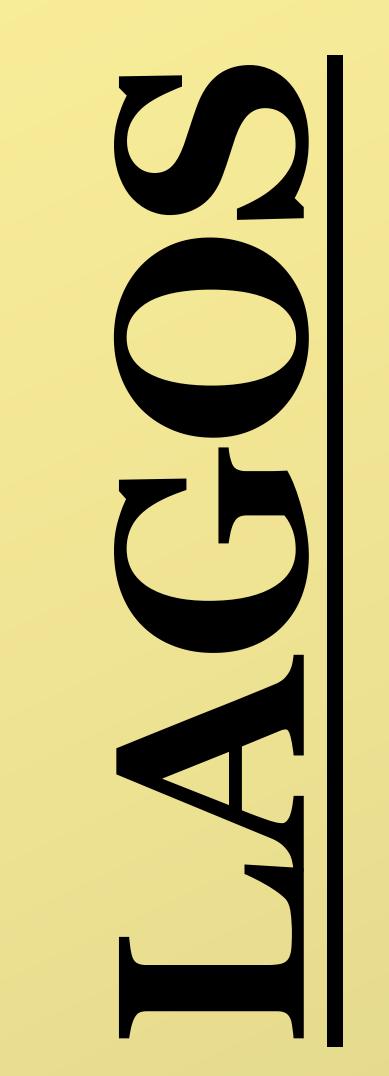
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