DOWNLOAD PDF 2. TYPES OF RUBBER AND THEIR ESSENTIAL PROPERTIES

Chapter 1 : Foam types - definitions of foam types, qualities and common uses

HYPALON RUBBER. Chlorosulphonated Polyethylene (CSM), widely known as HypalonÂ®, can in some respects be regarded as a superior type of chloroprene, having better heat ageing, chemical resistance and excellent low gas permeability. Ozone and weathering resistance is also excellent and electrical properties are good.

Check new design of our homepage! History, Types, and Uses Synthetic rubber has been widely used for many years now. Its durability gives it an edge when compared to natural rubber. The cost, on the other hand, is a point in favor of natural rubber. It is used in the manufacturing of tires, toys, belts, and gaskets, along with many other things. There are two varieties of rubber available to choose from - natural and man-made. Natural rubber is obtained from the exudation of plants, while the man-made variant, known as synthetic rubber, is synthesized from petroleum byproducts. Invention of Synthetic Rubber Since the invention of vulcanization, rubber has been used on a large scale in industries. The demand further increased with an increase in the manufacturing of automobiles. Thus, it was only natural for people to start looking into its composition. For this purpose, rubber was heated in order to break it down, and scientists found that it contained isoprene. Methyl isoprene, a type of synthetic rubber, was synthesized for the first time in the year , by a team that was led by Fritz Hofmann working at Bayer laboratory in Elberfeld, Germany. History of Synthetic Rubber Both the World Wars had played a vital role for different nations to look for options beyond natural rubber. During the First World War, there was a drop in the availability of natural rubber from the countries in South America, mainly Brazil. During the war, rubber became an essential commodity, as it was of use in each and every place and thing imaginable, like battlefields, residences, and various industries. Yet, the need to give an emphasis on the production of synthetic rubber was not as pronounced as it was during the Second World War. The plantations in Southeast Asia were under the control of the Japanese, which gave the Axis powers control over almost all the market of natural rubber. This prompted the United States to take major steps to drastically improve its production of synthetic rubber in a short span of time. Along with this, they also had subjected the rubber manufacturing plants of Germany to cripple their manufacturing of Buna rubber, that was made from butadiene Bu and Sodium Na. The production of synthetic rubber received a major boost during WWII; however, the demand for synthetic rubber continued to remain high even after the war had come to an end. Since then, there have been attempts to reduce the dependency on natural rubber. In the latter half of the 20th century, with improvement in quality, the demand for synthesized rubber had grown over its natural variant. Today, close to two-thirds of the total rubber that is used around the world is synthetic. Types and uses of Synthetic Rubber Various types of rubbers have been synthesized since the invention of synthetic rubber. Given below are some of the common types of synthetic rubbers that are used in different industries. Owing to these properties, it is used in laptop sleeves, gaskets, fan belts of automobiles, and hoses. This rubber shows better resistance to abrasion as well as wear and tear, and is hence used in tires, mainly of buses and aircraft. It is also used in conveyor belts and the soles of shoes. Along with heat and weather, this rubber shows good resistance to various chemicals. It is used in the heat collectors present in solar panels, mechanical vibrators, electrical insulation, and radiators. It shows better resistance to chemicals. This makes it useful in the production of lab gloves and oil seals. It is also used in synthetic leather, V belts, and O rings. It provides electrical insulation, and has low chemical and thermal conductivity. Also known as silicone rubber , it is used in coatings, as a sealant, and to make molds like the ones used in dentistry. It has good physical properties, and shows resistance to heat and weathering. It is used as a additive in oils and fuels. It is also used in the manufacturing of various sports goods, and chewing gum as well. Along with resistance to chemicals and temperature, this rubber also is resistant to UV light. It is used in coating as well roofing materials, and foldable kayaks. This rubber has good resistance to chemicals and temperature. It is used in the fabrication of silicon wafers. It is also used in chemical processing and high-pressure seals. This rubber has high flexibility, and shows good resistance to chemicals. It is used as buffers, and in the production of belts and moldings.

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Others Uses Apart from the uses mentioned above, some other uses of synthetic rubber include, Production of weather balloons. In fuel for launching rockets during WWII. As it is waterproof, it is used in the manufacturing inflatable boats and diving suits. Initially, rubber was used to rub out the marks of a pencil, and from here it derived its name.

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Chapter 2 : Types of Rubber | eMachineShop

There are many types of rubber, each with special properties: Neoprene Rubber - Good weatherability and resistance to abrasion. Buna-N Rubber - Resists oil and solvents.

You can use the guides below to help determine the best type for your product or project needs. If you have any technical questions please feel free to contact us. This material is an elastic polymer or elastomer derived from natural latex from certain plants and trees. Natural rubber has an excellent and long flex life with high tensile strength and can come in a wide range of hardness for various applications. Despite its extreme flexibility and stretchable properties it is subject to weathering and has a poor resistance to heat oil and ozone despite being generally waterproof. The physical properties of each specific family member varies but these forms of synthetic rubbers are generally resistant to attack from oils, minerals, fuels and solvents and offers a fair resistance to heat and aging. The varying ratio of nitrile within the polymer can change the characteristics. NBR is used throughout a wide range of industries and in the manufacture of countless products. This material has a satisfactory compatibility with fireproof hydraulic fluids, ketones, hot and cold water and alkalis and it has an unsatisfactory compatibility with most oils, gasoline, kerosene, aromatic and aliphatic hydrocarbons, halogenated solvents and concentrated acids. EPDM has outstanding heat, weather and ozone resistance and also has good resistance to polar substance as well as steam. Chloroprene is colorless, toxic and flammable liquid which has several modern production processes for the creation of CR. The result is a well-rounded, general purpose rubber with a high tensile strength and resilience along with oil and flame resistance. It also has a resistance to oxygen and ozone and good weather resistance. This material has a broad range of uses because of this stability and its ability to be easily shaped and formed into application specific designs. Depending on the end use heat or vulcanization may be required to cure the silicone into its final rubber form. All FKMs contain vinylidene fluoride as a monomer. Fluoroelastomers are more costly than neoprene or nitrile rubber in part because they provide additional heat and chemical resistance. They also have excellent hot oil, aliphatic and aromatic hydrocarbon resistance. There are different classes of FKMs based on their chemical composition, fluorine content or crosslinking mechanism. These rubbers have good abrasion resistance and good stability with aging over time when protected by additives. Higher levels of styrene are less elastic and flexible than other versions. This material combines the best properties of rubber and plastic and is used in the manufacture flexible, highly-resilient gaskets, bushings and other products throughout various industries. Additionally, polyeurethane can withstand extreme temperatures and is very oil and fuel resistant. This material can stand extreme temperatures and is fuel and oil resistant. Because of these qualities Viton is used in many industries to create tubes and hoses and certain types of the material are more resistant to acidic biodiesel. It is incompatible for use with ketones, acetone and organic acids such as acetic acid.

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Chapter 3 : Types of Rubber and Basic Properties - All Seals Inc. - The Sealing Specialists

Choose the Right Rubber. As a contract manufacturer of rubber materials with over 50 years of experience, Advanced Rubber Products has worked with clients on a wide range of products.

Custom molded rubber materials serve a variety of purposes, and can often mean the difference between life and death. Our team takes full responsibility for product reliability. If the rubber component fails to do its job correctly, the costs quickly grow. However, in the process of custom rubber molding, excess material is inevitable. With some smaller and more oddly shaped parts, it can be even more difficult to remove this excess material. Advanced Rubber Products uses the highly effective and precise process of cryogenic deflashing to remove unwanted or unnecessary rubber from custom molded components. The part is then bombarded with tiny pellets, removing all the excess rubber flash. ARP understands the importance of your products and realizes that if an unexpected event occurs i. This is why we maintain a well-organized warehouse with extra on-demand products. This is only one part of the rubber organization process at ARP. Advanced Rubber Products ensures the exact specifications and quality of products with Julian Dates on their custom molded rubber products. Choosing the Right Rubber Choose the Right Rubber As a contract manufacturer of rubber materials with over 50 years of experience, Advanced Rubber Products has worked with clients on a wide range of products. Advanced Rubber Products is able to mold a wide range of rubber materials. Simply provide us with your product design and drawing, and we will guide you through each step of the process, which includes selected the proper rubber material. Our team of experts will work with you and your design and find the rubber with the exact properties suited for your product and help to bring it to market quicker. Below are the more commonly used rubber materials that Advanced Rubber Products is able to custom mold. Natural rubber is a polymer of isoprene and has a molecular weight of , to 1,, An organic material, sometimes traces of other materials such as proteins, resins and inorganic materials can be found in high quality natural rubber. Natural rubber is formed in the bark of tropical trees. Both can be used for similar applications although isoprene rubber has less green strength than natural rubber. EPDM is a very durable, high-density rubber making it a preferred material for products like gaskets, hoses and seals. The rubber is extremely resistant to to heat, oxidation and weather due to its stable structure. Nitrile Rubber NBR Nitrile rubber is a copolymer of butadiene and acrylonitrile and is used most commonly in sealing products. NBR is extremely resistant to oil and is therefore used in automotive seals, gaskets and other products that contact hot oils and fuels. NItrile rubber is also a very resilient material making it ideal for products such as cleaning and examination gloves. Gloves made with nitrile rubber are three times more resistant to punctures than gloves made with natural rubber or isoprene. Styrene Butadiene Rubber SBR Styrene butadiene rubber is a synthetic rubber that is more resistant to abrasion than natural rubber. It is predominantly used in automobile and truck tires as it stands up to heat and cracks and ages well. The higher the styrene content in the rubber, the harder and less flexible the product becomes. Silicone Rubber Silicone rubber is a polymer composed of silicon combined with carbon, hydrogen and oxygen. Resilient and durable, silicone rubber materials resist prolonged exposure to sunlight, oxygen, ozone, moisture and UV light. Silicone rubber does have its weaknesses however as products made of the elastomer are subject to tears and abrasions. During manufacturing, heat is required to vulcanize cure the silicone into its rubber-like form. Butyl Rubber Butyl is a synthetic rubber, also referred to as isobutylene isoprene. Butyl rubber has a variety of uses and applications but its true value is its impermeability to air and gases. Butyl is also very resistant to water and steam, which is why butyl rubber is used in sealants for damp proofing, rubber roof repair and rubber membrane maintenance. First used as tire inner tubes, butyl rubber is now applied to sporting ball bladders, gas masks and protective clothing, vial stoppers, explosives, chewing gum and is even used as an additive in lubricating oils and motor fuels. The addition of small amounts of polyisobutylene in lubricating oils results in a significant reduction of oil mist inhaled by a machine operator. Polybutadiene The majority of polybutadiene is produced to manufacture automobile tires. The rubber is resistant to abrasion, which is why polybutadiene is used to improve treads for large truck tires. The elastomer can be very flexible, is resistant to electricity, has a high heat tolerance and used to manufacture various types of elastic objects. Polybutadiene is also a material used to manufacture golf balls.

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Chapter 4 : What's the Difference Between Silicone and EPDM? |

Natural rubber is made from the sap of a tree grown in renewable plantations, and it is fully biodegradable. Since the early s, natural rubber has been used for commercial purposes, and it has a very high resilience compared with all other types.

Natural Rubber And Properties How natural rubber is made and what are the different types of rubber? Everyone must have come across rubber products. There are many rubber products which we come across in our daily life. For example rubber gloves, rubber band, footwear, etc. We all have seen that rubber items have the ability to recover their shapes after being stretched or distorted and hence rubber is referred to as elastomers. It is an elastic substance which can be obtained both by naturally natural rubber or they can also be synthesized chemically in laboratories synthetic rubber-like butyl rubber, neoprene, etc. Natural rubber These are the elastomers which are obtained naturally. It is made up of solids particles suspended in milky white liquid, called latex that drips from the bark of tropical and subtropical trees. It is made by the polymerization of isoprene 2 methyl-1, 3-butadiene which has a chemical formula C5H8 n and it is known as cis- 1, 4-polyisoprene. In simple words, we can say that they are made by loosely joining the monomers of isoprene C5H8 in the form of a long tangled chain. Preparation of Natural Rubber: Rubber tapping â€" The milky white liquid latex is collected from the rubber trees in a cup by making a slight V-cut on the tree bark. The collected latex is washed, filtered and reacted with acids to congeal the rubber particles. Mastication â€" The rubber obtained from the tapping process is still not ready to be used. When it is cold it is very brittle in nature and when warmed up it becomes very gluey. To remove the brittle nature and strong odor of the rubber, it is allowed to pass through the rollers and is pressed to make it softer and flexible to work. This process is repeated based on the properties that are required for the rubber. In this process, extra chemical ingredients are also added to enhance the properties of rubber. Calendering is a process, which is mainly performed to provide shapes to rubber using rollers and proper mixing of the chemical ingredients. The final product obtained is then extruded to make hollow tubes by passing them through specially designed holes in an extrusion machine. Vulcanization â€" Even after performing all these steps rubber is not much stronger and harder to be used in various items like car tires and machinery. To enhance all these properties, sulphur is added to the rubber and it is heated at a temperature ranging k to k. This process is known as vulcanization. Sulphur acts as a cross-linking agent and after vulcanization, rubber gets cross-linked and becomes hard. Synthetic rubbers Synthetic rubbers are produced from petroleum and natural gas. It is obtained by polymerization of 1, 3 â€" butadiene derivatives or by copolymerization of 1, 3 â€" butadiene along with unsaturated monomer. Preparation of synthetic rubbers: This is just the brief layout of preparation of rubber products. To know more about the Natural Rubber products and how it is made. Practise This Question A crystalline structure made of many small crystals. A large molecule made out of many repeating subunits. A macromolecule made from organic molecules.

Chapter 5 : Types of Rubber Sheets Available to Market

To enhance all these properties, sulphur is added to the rubber and it is heated at a temperature ranging k to k. This process is known as vulcanization. Sulphur acts as a cross-linking agent and after vulcanization, rubber gets cross-linked and becomes hard.

This is significant because, with many other types of rubber, low temperatures can make them very brittle and easy to shatter. Butyl Rubber Click for price Butyl rubber is also called Isobutylene-isoprene , or IIR, and it was developed in the s as a synthetic rubber. It is very resistant to ozone, heat, and weathering, and you can even use it to dilute both alkalis and acids. However, it is not a good product to use in petroleum- or mineral-based fluids, and you can often find it in seals, O-rings, bottle closures, diaphragms, liners, gaskets, inner tubes, and even speaker surrounds. It is on oil resistant synthetic rubber with moderate resistance to petroleum-based fuels and oils. It is a good all-purpose type of rubber, in part because it has a good balance of chemical and physical properties. It does better than natural rubber when it comes to resistance to heat, ozone, and oil, but it also has a lower level of physical properties. Applications for CR include seals, gaiters, belting, cable jackets, and various types of coated fabric. In addition to its reasonable price, CR absorbs water slowly and its flame resistance is very good. It has good resilience and is one of only a handful of rubbers that self-extinguishes. Although some types of CR can crystallize and harden when stored, they always thaw when heated. EPDM also has good resistance to polar fluids and has great physical properties. With the exception of exposure to di-ester lubricants and petroleum-based fluids, EPDM is a good type of rubber to make items such as cable connectors, insulators, gaskets and hoses, seals, accumulator bladders, and diaphragms. Epichlorohydrin Rubber Click for price Epichlorohydrin, or ECO rubber, is very similar to nitrile rubber when it comes to its properties, only with better resistance to petrol, heat, and oil. ECO has low gas permeability and low-temperature flexibility, not to mention excellent resistance to ozone, alkalis, and acids. Of course, it is difficult to use ECO rubber as a sealing material because of its poor compression set limits, and since it tends to corrode metals, your tooling costs might be high and your metal-bonding applications could be limited. ECO rubber is used in vehicle fuel systems, rollers, bladders, and diaphragms. They are resistant to weathering, ozone, oils, and most chemicals as well. Most applications that use fluoroelastomers include seals, gaskets, accumulator bladders, diaphragms, and O-rings. Their oil resistance is moderate, but they have very good electrical strength. They are expensive to use in many applications, but they do make good diaphragms, gaskets, seals, O-rings, hose linings, and fuel system components for the aerospace industry. Hydrogenated Nitrile Rubber Click for price Hydrogenated nitrile rubber, or HNBR, can withstand very high temperatures and is resistant to things such as hot water, steam, ozone, and sour oil and gas. With a medium price, HNBR does have some limitations. It has poor flame resistance and poor electrical properties, but it does well when making products such as diaphragms, accumulator bladders, and gaskets and seals. These rubbers are mostly used in the oil and gas industries. It has very good low gas permeability, better heat aging, and great chemical resistance compared to other types of rubber. CSM is weather and ozone resistant, and it has good electrical properties as well. CSM should not be used in certain applications because of its poor fuel resistance and its poor compression set, including dynamic sealing applications. The most common applications for CSM include various static seals, as well as components which tend to go through hot, humid weather or exposure to things such as hot gases and liquids. They provide reliable long-term services with various electronic- and industrial-grade chemicals and this type of rubber is also used in the pharmaceutical, aerospace, and oil and gas industries. Most of their products consist of O-rings in either standard sizes or custom shapes. Natural Rubber Natural rubber is made from the sap of a tree grown in renewable plantations, and it is fully biodegradable. Since the early s, natural rubber has been used for commercial purposes, and it has a very high resilience compared with all other types. It has good fatigue resistance, tear strength and compression set and, therefore, it is great for dynamic applications at both ambient and low temperatures. Natural rubber is used with water and some dilute alkalis, acids, and other chemicals, and it is the preferable type of rubber for most aqueous applications. It is not suitable for oils and fuels with a petroleum base, but its most common applications include haul-off pads, tires, anti-vibration mounts, and drive couplings. It is also susceptible to ozone attacks unless it is combined with specific anti-ozone compounds. Nitrile Rubber Nitrile rubber is formally called acrylonitrile butadiene rubber, and it was developed in as the first type of rubber that was oil resistant. With moderate physical properties and good abrasion resistance, nitrile rubber can have high or low acrylonitrile content, with the former having better oil resistance than the latter. Nitrile has low gas permeability and poor electrical properties and ozone resistance, as well as poor flame resistance. What all of these attributes mean is that nitrile rubber is not suitable for certain applications â€" for instance, those with polar solvents such as MEK. There are certain grades of nitrile rubber that can be mixed with PVC, improving its resistance to ozone, flame, petrol, and aging. Some of its applications include diaphragms, gaskets, hose liners, accumulator bladders, seals, and O-rings. At low temperatures, their use is limited, and they have poor physical properties as well. They are also very expensive but are used in parts such as accumulator bladders, O-rings, gaskets, and core sleeves, to name a few. Polyacrylic Rubber Click for price Polyacrylic, also called ACM, is resistant to oxidation and hot hydraulic oil, as well as to weathering and ozone. Its resistance to water, acids, and alkalis, however, is quite low. Polyacrylic is used in vibration damping and is not very resilient in low temperatures. A common application for polyacrylic rubber is automotive transmission components which require resistance to hot fuel or oil. Polyurethane Rubber Click for price Polyurethane actually comes in two main types: They are very resistant to ozone, petroleum-based oils and fuels, and oxidation, as well as abrasion. The physical properties of AU are a little better than those for EU, and with both of these rubbers, the electrical properties are good. AUs can be affected by high humidity and hot water, and they have low resistance to alkalis and acids. Because most polyurethanes have high damping, caution must be used with tire speeds of over eight miles per hour. Polyurethane rubber is commonly used in applications that include diaphragms, gaskets, hoses and seals, abrasion-resistant linings and coatings, haul-off pads, and even many tires and wheels. Silicone Rubber Perfect for both low- and high-temperature applications, silicone rubber boasts of great electrical properties and resistance to ozone attack and weathering. It is not, however, resistant to super-heated steam, and its physical properties are low, although they are retained at higher temps. It is not very resistant to petroleum-based fluids, and its gas permeability is very poor. It is also a very expensive type of rubber to use compared to other types. There are food-quality grades of silicone rubber that are FDA compliant and used in both the food and pharmaceutical industries. Silicone rubber is used in food and baking products, electronics, various medical devices , sealants, hardware products, and some home repair products. It is not as good as natural rubber when it comes to physical strength, low-temperature properties, and resilience, but fares a little better when it comes to resistance to abrasion and its heat-aging properties. SBR is nonresistant to fuel or oil, and it is also prone to weathering. This type of rubber is used in car tires, haul-off pads, drive couplings, and in the soles and heels of various types of shoes. Vulcanized Rubber Even though vulcanized rubber is made from natural rubber, it is a completely separate type. In its natural form, natural rubber is usually not good for commercial or industrial products. This is why the vulcanization process is often used; it improves natural rubber properties and converts the rubber into a more useful rubber type. Vulcanized rubber is less sticky and has great mechanical properties. It also comes in various hardness levels, which vary according to the amount of Sulphur used during the manufacturing process. Other products made from vulcanized rubber include hoses and soles for shoes, to name a few. Some of the advantages of vulcanized rubber include: It is very hard It is elastic and flexible It is very strong It can stand up to a lot of damage and stress It is stretch resistant and rigid There are really no serious disadvantages to vulcanized rubber, except that in some circumstances it can be mildly toxic, such as when it is burned. In fact, this is essentially the only way vulcanized rubber is considered a liability, because other than burning it, there are no disadvantages to products made with vulcanized rubber.

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Chapter 6 : Polymers and plastics: a chemical introduction

Rubber is a natural polymer of Isoprene (2-Methyl -1, 3 - Butadiene). It is a linear, 1, 4 - addition polymer of Isoprene. Natural rubber has elastic properties and it undergoes long range reversible extension even if relatively small force is applied to it.

How to Use Essential oils, also called volatile oils, are scented oils extracted from plants. Others can affect cognitive function, mood, and memory. Some can even help alleviate stiff, sore muscles and joints. Some essential oils can be applied to the skin, others are best taken orally. However â€" and this is important â€" do not ingest or topically apply any essential oils unless you are absolutely certain that they can be used this way. Not all essential oils are safe to take internally and some can irritate the skin. Health Benefits of Common Oils One of the primary benefits of essential oils is that, when used properly, they offer many benefits and have few, if any, side effects. Many essential oils are effective against harmful organisms. Some can positively affect your mood and mental state. Some essential oils can even help you reduce a headache or feelings of nausea. Lavender Oil Derived from fresh lavender flowers, lavender oil is one of the most well known essential oils. It appears to slow the activity of the central nervous system, improve sleep quality, promote better concentration, and help encourage hair regrowth in those suffering from alopecia areata, a type of hair loss. In one study, encapsulated lavender oil was found to be effective for generalized anxiety disorder, without sedative effects or potential for abuse. Inhaling eucalyptus steam can help alleviate a cough and congestion. The aroma of the oil acts as an expectorant, helping to loosen phlegm in the nasal passages and lungs. The same study also found the scent of these two essential oils reduce headaches and promote mental and muscular relaxation. It works on the digestive system by speeding up the rate of elimination. Peppermint oil calms the involuntary smooth muscle of the stomach, producing an antispasmodic effect, and improves the flow of bile. More research is needed, but preliminary results suggest topical application may fight outbreaks. Bundjalung aborigines native to Australia inhaled the aroma of crushed leaves to relieve cough and used poultices to help heal wounds. Today, we know that tea tree oil is antibacterial, antifungal, antiviral, and antiprotozoal. The oil can be applied topically to cuts to discourage infection. Historically, Native Americans used jojoba oil to help wounds heal. Jojoba oil contains unique fatty acids and fatty alcohol esters that are similar, but superior, to those found in sperm whales. Evidence indicates that clay-jojoba oil facial masks might be an effective remedy for mild acne. The vibrant color of blue chamomile oil is a result of the steam extraction process â€" the azulene content in the oil darkens to an inky blue, brilliant azure, or deep green. Chamomile has been used therapeutically for thousands of years by Greeks, Romans, and Egyptians to remedy everything from skin conditions and injuries to fever and insomnia. One study found that chamomile inhibits and prevents a chemical process in the body that incites inflammation. Like lavender, chamomile oil offers a mild anti-anxiety effect for those who suffer from generalized anxiety disorder. In contrast, rose absolute is not an essential oil because the essence of the rose is extracted using a more intense chemical extraction processes. Like other essential oils, rose oil promotes a calm mood and fights harmful organisms. Oregano Oil Oregano oil contains carvacrol, a powerful organic compound with a long list of beneficial properties, including fighting harmful organisms. While many of the essential oils mentioned are sleep aids and relaxants, jasmine oil has a stimulating effect. When applied topically, jasmine oil increases alertness, breathing rate, and vigor. These effects may promote an uplifted mood and better sense of well-being. Unlike most essential oils, copaiba oil can be taken orally. One of the major benefits of Neroli oil is that it helps relieve symptoms associated with menopause and stress. Some research suggests pomegranate oil may even delay the development of colon cancer[39] and skin cancer. Some oils can only be used aromatically and should not be applied to the skin or taken orally. You may have noticed that many of the oils are effective against harmful organisms. Others can kill cells indiscriminately, including normal tissue cells. Neroli oil, for example, promotes circulation and soothes irritation. Rose oil moisturizes the skin and is used as a gentle toner. It encourages healthy-looking, radiant skin and promotes well-being. Do you use essential oils? Leave a comment below and share your tips with us! University of Maryland Medical Center,

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Chapter 7 : Types of Gaskets | RAM Gasket Solutions

TYPES OF RUBBER USED AT HOLZ. Holz Rubber Company uses varying types of rubber. Selecting the right polymer base is important to each project. Our experienced staff works with you to determine what type of rubber works best for your application.

This section needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. August Learn how and when to remove this template message On a microscopic scale, relaxed rubber is a disorganized cluster of erratically changing wrinkled chains. In stretched rubber, the chains are almost linear. The restoring force is due to the preponderance of wrinkled conformations over more linear ones. For the quantitative treatment see ideal chain , for more examples see entropic force. Cooling below the glass transition temperature permits local conformational changes but a reordering is practically impossible because of the larger energy barrier for the concerted movement of longer chains. The parallel chains of stretched rubber are susceptible to crystallization. This takes some time because turns of twisted chains have to move out of the way of the growing crystallites. Crystallization has occurred, for example, when, after days, an inflated toy balloon is found withered at a relatively large remaining volume. Where it is touched, it shrinks because the temperature of the hand is enough to melt the crystals. Vulcanization of rubber creates di- and polysulfide bonds between chains, which limits the degrees of freedom and results in chains that tighten more quickly for a given strain, thereby increasing the elastic force constant and making the rubber harder and less extensible. Malodour[edit] Raw rubber storage depots and rubber processing can produce malodour that is serious enough to become a source of complaints and protest to those living in the vicinity. These impurities break down during storage or thermal degradation and produce volatile organic compounds. This produces malodourous hydrogen sulphide. Synthetic cis-polyisoprene and natural cis-polyisoprene are derived from different precursors, isopentenyl pyrophosphate and isoprene. Latex is the polymer cis-1,4-polyisoprene â€” with a molecular weight of , to 1,, daltons. Polyisoprene can also be created synthetically, producing what is sometimes referred to as "synthetic natural rubber", but the synthetic and natural routes are different. Natural rubber is an elastomer and a thermoplastic. Once the rubber is vulcanized, it is a thermoset. Most rubber in everyday use is vulcanized to a point where it shares properties of both; i. The final properties of a rubber item depend not just on the polymer, but also on modifiers and fillers, such as carbon black , factice , whiting and others. Biosynthesis[edit] Rubber particles are formed in the cytoplasm of specialized latex-producing cells called laticifers within rubber plants. The membrane allows biosynthetic proteins to be sequestered at the surface of the growing rubber particle, which allows new monomeric units to be added from outside the biomembrane, but within the lacticifer. The rubber particle is an enzymatically active entity that contains three layers of material, the rubber particle, a biomembrane and free monomeric units. The biomembrane is held tightly to the rubber core due to the high negative charge along the double bonds of the rubber polymer backbone. The monomer adds to the pyrophosphate end of the growing polymer. The reaction produces a cis polymer. The initiation step is catalyzed by prenyltransferase , which converts three monomers of isopentenyl pyrophosphate into farnesyl pyrophosphate. The required isopentenyl pyrophosphate is obtained from the mevalonate pathway, which derives from acetyl-CoA in the cytosol. Though rubber is known to be produced by only one enzyme, extracts of latex host numerous small molecular weight proteins with unknown function. The proteins possibly serve as cofactors, as the synthetic rate decreases with complete removal. The image shows a coconut shell used in collecting latex, in plantations in Kerala , India. Since the bulk is synthetic, which is derived from petroleum, the price of natural rubber is determined, to a large extent, by the prevailing global price of crude oil. The three largest producers, Thailand , Indonesia 2. Natural rubber is not cultivated widely in its native continent of South America due to the existence of South American leaf blight , and other natural predators. Cultivation[edit] Rubber latex is extracted from rubber trees. The soil requirement is well-drained, weathered soil consisting of laterite , lateritic types, sedimentary types, nonlateritic red or alluvial soils. The climatic conditions for optimum growth of rubber trees are: Collection[edit] A woman in Sri Lanka harvesting rubber, circa In places such as Kerala and Sri Lanka where coconuts are in abundance, the half shell of coconut was used as the latex collection container. Glazed pottery or aluminium or plastic cups became more common in Kerala and other countries. The cups are supported by a wire that encircles the tree. This wire incorporates a spring so it can stretch as the tree grows. The latex is led into the cup by a galvanised "spout" knocked into the bark. Tapping normally takes place early in the morning, when the internal pressure of the tree is highest. A good tapper can tap a tree every 20 seconds on a standard half-spiral system, and a common daily "task" size is between and trees. Trees are usually tapped on alternate or third days, although many variations in timing, length and number of cuts are used. These slanting cuts allowed latex to flow from ducts located on the exterior or the inner layer of bark cambium of the tree. Since the cambium controls the growth of the tree, growth stops if it is cut. Thus, rubber tapping demanded accuracy, so that the incisions would not be too many given the size of the tree, or too deep, which could stunt its growth or kill it. The economic life of the tree depends on how well the tapping is carried out, as the critical factor is bark consumption. The latex-containing tubes in the bark ascend in a spiral to the right. For this reason, tapping cuts usually ascend to the left to cut more tubes. The trees drip latex for about four hours, stopping as latex coagulates naturally on the tapping cut, thus blocking the latex tubes in the bark. Tappers usually rest and have a meal after finishing their tapping work, then start collecting the liquid "field latex" at about midday. Each has significantly different properties. The latex that coagulates on the cut is also collected as "tree lace". Latex that drips onto the ground, "earth scrap", is also collected periodically for processing of low-grade product. Cup lump[edit] Cup lump is the coagulated material found in the collection cup when the tapper next visits the tree to tap it again. It arises from latex clinging to the walls of the cup after the latex was last poured into the bucket, and from late-dripping latex exuded before the latex-carrying vessels of the tree become blocked. It is of higher purity and of greater value than the other three types. Tree lace[edit] Tree lace is the coagulum strip that the tapper peels off the previous cut before making a new cut. It usually has higher copper and manganese contents than cup lump. Both copper and manganese are pro-oxidants and can damage the physical properties of the dry rubber. Many Indonesian smallholders, who farm paddies in remote areas, tap dispersed trees on their way to work in the paddy fields and collect the latex or the coagulated latex on their way home. As it is often impossible to preserve the latex sufficiently to get it to a factory that processes latex in time for it to be used to make high quality products, and as the latex would anyway have coagulated by the time it reached the factory, the smallholder will coagulate it by any means available, in any container available. Some smallholders use small containers, buckets etc. Little care is taken to exclude twigs, leaves, and even bark from the lumps that are formed, which may also include tree lace. Earth scrap[edit] Earth scrap is material that gathers around the base of the tree. It contains soil and other contaminants, and has variable rubber content, depending on the amount of contaminants. Earth scrap is collected by field workers two or three times a year and may be cleaned in a scrap-washer to recover the rubber, or sold to a contractor who cleans it and recovers the rubber. It is of low quality. Processing[edit] Removing coagulum from coagulating troughs. Latex coagulates in the cups if kept for long and must be collected before this happens. The collected latex, "field latex", is transferred into coagulation tanks for the preparation of dry rubber or transferred into air-tight containers with sieving for ammoniation. Ammoniation preserves the latex in a colloidal state for longer periods of time. Latex is generally processed into either latex concentrate for manufacture of dipped goods or coagulated under controlled, clean conditions using formic acid. Processing for these grades is a size reduction and cleaning process to remove contamination and prepare the material for the final stage of drying. This section does not cite any sources. Please help improve this section by adding citations to reliable sources. April Main article: Sulfur vulcanization Torn latex rubber dry suit wrist seal Natural rubber is often vulcanized, a process by which the rubber is heated and sulfur , peroxide or bisphenol are added to improve resistance and elasticity and to prevent it from perishing. Before World War II, carbon black was often used as an additive to rubber to improve its strength, especially in vehicle tires. Transportation[edit] Natural rubber latex is shipped from factories in south-west Asia, South America, and West and Center Africa to destinations around the world. As the cost of natural rubber has risen significantly and rubber products are dense, the shipping methods offering the lowest cost per unit weight are preferred. Depending on destination, warehouse availability, and transportation conditions, some methods are preferred by certain buyers. In international trade, latex rubber is mostly shipped in foot ocean containers. Inside the container, smaller containers are used to store the latex. November This section possibly contains original research. Please improve it by verifying the claims made and adding inline citations. Statements consisting only of original research should be removed. November Learn how and when to remove this template message Uncured rubber is used for cements; [33] for adhesive, insulating, and friction tapes; and for crepe rubber used in insulating blankets and footwear. Vulcanized rubber has many more applications. Resistance to abrasion makes softer kinds of rubber valuable for the treads of vehicle tires and conveyor belts, and makes hard rubber valuable for pump housings and piping used in the handling of abrasive sludge. The flexibility of rubber is appealing in hoses, tires and rollers for devices ranging from domestic clothes wringers to printing presses; its elasticity makes it suitable for various kinds of shock absorbers and for specialized machinery mountings designed to reduce vibration. Its relative gas impermeability makes it useful in the manufacture of articles such as air hoses, balloons, balls and cushions. The resistance of rubber to water and to the action of most fluid chemicals has led to its use in rainwear, diving gear, and chemical and medicinal tubing, and as a lining for storage tanks, processing equipment and railroad tank cars. Because of their electrical resistance, soft rubber goods are used as insulation and for protective gloves, shoes and blankets; hard rubber is used for articles such as telephone housings, parts for radio sets, meters and other electrical instruments.

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Chapter 8 : 18 Different Types of Rubber (Plus Essential Facts)

Rubber is one of the most commonly and extensively used commodity in today's world. It is used in the manufacturing of tires, toys, belts, and gaskets, along with many other things.

May 17, by Sagar Aryal Antigen is a substances usually protein in nature and sometimes polysaccharide, that generates a specific immune response and induces the formation of a specific antibody or specially sensitized T cells or both. Although all antigens are recognized by specific lymphocytes or by antibodies, only some antigens are capable of activating lymphocytes. Molecules that stimulate immune responses are called Immunogens. Epitope is immunologically active regions of an immunogen or antigen that binds to antigen-specific membrane receptors on lymphocytes or to secreted antibodies. Thyroglobulin, DNA, Corneal tissue, etc. Alloantigens are antigens found in different members of the same species the red blood cell antigens A and B are examples. Heterophile antigens are identical antigens found in the cells of different species. Forrssman antigen, Cross-reacting microbial antigens, etc. Chemical Nature of Antigens Immunogens A. Proteins The vast majority of immunogens are proteins. These may be pure proteins or they may be glycoproteins or lipoproteins. In general, proteins are usually very good immunogens. Polysaccharides Pure polysaccharides and lipopolysaccharides are good immunogens. Nucleic Acids Nucleic acids are usually poorly immunogenic. However, they may become immunogenic when single stranded or when complexed with proteins. Lipids In general lipids are non-immunogenic, although they may be haptens. Exogenous antigens These antigens enters the body or system and start circulating in the body fluids and trapped by the APCs Antigen processing cells such as macrophages, dendritic cells, etc. The uptakes of these exogenous antigens by APCs are mainly mediated by the phagocytosis Examples: The endogenous antigens are processed by the macrophages which are later accepted by the cytotoxic T â€” cells. Endogenous antigens include xenogenic heterologous , autologous and idiotypic or allogenic homologous antigens. Autoantigens An autoantigen is usually a normal protein or complex of proteins and sometimes DNA or RNA that is recognized by the immune system of patients suffering from a specific autoimmune disease These antigens should not be, under normal conditions, the target of the immune system, but, due mainly to genetic and environmental factors, the normal immunological tolerance for such an antigen has been lost in these patients. Nucleoproteins, Nucleic acids, etc. Complete Antigen or Immunogen Posses antigenic properties denovo, i. High molecular weight more than 10, May be proteins or polysaccharides 2. Incomplete Antigen or Hapten These are the foreign substance, usually non-protein substances Unable to induce an immune response by itself, they require carrier molecule to act as a complete antigen. The carrier molecule is a non-antigenic component and helps in provoking the immune response. Serum Protein such as Albumin or Globulin. Low Molecular Weight Less than 10, Haptens can react specifically with its corresponding antibody. Determinants of Antigenicity The whole antigen does not evoke immune response and only a small part of it induces B and T cell response. The small area of chemical grouping on the antigen molecule that determines specific immune response and reacts specifically with antibody is called an antigenic determinant. An antigen must be a foreign substances to the animal to elicit an immune response. Molecular Size The most active immunogens tend to have a molecular mass of 14, to 6,00, Da. Insulin are either non-antigenic or weakly antigenic. Chemical Nature and Composition In general, the more complex the substance is chemically the more immunogenic it will be. Antigens are mainly proteins and some are polysaccharides. It is presumed that presence of an aromatic radical is essential for rigidity and antigenicity of a substance. Physical Form In general particulate antigens are more immunogenic than soluble ones. Denatured antigens are more immunogenic than the native form. Antigen Specificity Antigen Specificity depends on the specific actives sites on the antigenic molecules Antigenic determinants. Antigenic determinants or epitopes are the regions of antigen which specifically binds with the antibody molecule. Species Specificity Tissues of all individuals in a particular species possess, species specific antigen. Human Blood proteins can be differentiated from animal protein by specific antigen-antibody reaction. Certain proteins of brain, kidney, thyroglobulin and lens protein of one species share specificity with that of another species. Auto-specificity The autologous or self antigens are ordinarily not immunogenic, but under certain circumstances lens protein, thyroglobulin and others may act as autoantigens. Genetic Factors Some substances are immunogenic in one species but not in another. Similarly, some substances are immunogenic in one individual but not in others i. The species or individuals may lack or have altered genes that code for the receptors for antigen on B cells and T cells. They may not have the appropriate genes needed for the APC to present antigen to the helper T cells. Age Age can also influence immunogenicity. Usually the very young and the very old have a diminished ability to elicit and immune response in response to an immunogen. Degradability Antigens that are easily phagocytosed are generally more immunogenic. This is because for most antigens T-dependant antigens the development of an immune response requires that the antigen be phagocytosed, processed and presented to helper T cells by an antigen presenting cell APC. Dose of the antigen The dose of administration of an immunogen can influence its immunogenicity. There is a dose of antigen above or below which the immune response will not be optimal. The route of antigen administration can also alter the nature of the response. Antigen administered intravenously is carried first to the spleen, whereas antigen administered subcutaneously moves first to local lymph nodes. Adjuvants Substances that can enhance the immune response to an immunogen are called adjuvants. The use of adjuvants, however, is often hampered by undesirable side effects such as fever and inflammation. These antigens are called superantigens. Examples of superantigens include: Staphylococcal enterotoxins food poisoning , Staphylococcal toxic shock toxin toxic shock syndrome , Staphylococcal exfoliating toxins scalded skin syndrome and Streptococcal pyrogenic exotoxins shock. Although the bacterial superantigens are the best studied there are superantigens associated with viruses and other microorganisms as well. The diseases associated with exposure to superantigens are, in part, due to hyper activation of the immune system and subsequent release of biologically active cytokines by activated T cells.

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Chapter 9 : Types of Rubber - Southern Michigan Rubber

Among many types of rubber, neoprene is one of the most balanced compounds. The all-purpose rubber boasts excellent resistance to ozone, oxidation and can tolerate a large range of temperatures.

It is a linear, 1, 4 â€" addition polymer of Isoprene. Natural rubber has elastic properties and it undergoes long range reversible extension even if relatively small force is applied to it. Therefore, it is also known as Elastomer. Natural rubber is prepared from latex which is a Colloidal Solution of Rubber in Water With her write-ups,she tends to make every complex Chemistry concept look dead simple to perplexed minds. She has exhaustively written Chemistry related articles at XAmplified, explaining various concepts and phenomenons. Table Of Content What is rubber? Rubber is a natural polymer of Isoprene 2-Methyl -1, 3 â€" Butadiene. Natural rubber is prepared from latex which is a Colloidal Solution of Rubber in Water. Where is Rubber found? To understand the structure of Rubber we shall concentrate on structure of Isoprene. Isoprene is a conjugated diene containing double bonds at alternate position. Monomer of Natural Rubber Isoprene undergoes free radical polymerization like substituted ethylene. Isoprene polymerizes to give Polyisoprene polymer, a simple alkene having each unit still containing one double bond. Now, polymerization of Isoprene may follow either of the two pathways; either of cis-polymerization or trans-polymerization. The rubber formed from cis-polymerization is called cis-Polyisoprene or Natural Rubber. Similarly, the rubber formed from trans-polymerization is called Synthetic Rubber. Isoprene 2-Methyl -1, 3-butadiene undergoes cis-polymerization to form natural rubber Structure of Natural Rubber Cis Polyisoprene By observing structure of natural rubber we can infer that there is no polar group in this structure. As a result of this the intermolecular forces of attraction are weak Vanderwaal forces of attraction. These forces of attraction are further weakened because of the cis-configuration of all the double bonds that does not permit the close interaction of polymer chains. Thus Natural Rubber Cis Polyisoprene does not have a straight chain but has a coiled structure. As a result of this, it gets elastic property. Synthetic Rubber Polymerization of deines molecules containing double bond to form substitutes for rubber is the forerunner of the enormous present day plastic industry. Chloroprene was the first commercially successful rubber substitute produced in the United States. Chloroprene undergoing trans-polymerization to produce Synthetic Rubber, Polychloroprene The properties of Rubber so formed are determined by the nature of the substitutent groups. For example, Polychloroprene is inferior to natural rubber in some properties but superior in its resistance to oil, Organic Solvents. These differences are due to difference in nature of their monomers: Isoprene for natural rubber and Chloroprene for synthetic rubber. Synthetic Rubber also known as Gutta-Percha was obtained by the free radical polymerization of Isoprene. The rubber so formed has all trans- Configuration. As a result of this, synthetic rubber has a highly regular zig-zag chain which cannot be stretched. This accounts for non-elasticity of Synthetic Rubber. It is also known as Polychloroprene. To synthesize Neoprene its monomer Chloroprene is required. Chloroprene required for this process is synthesized from Vinylacetylene which performs Markonikov addition under acidic condition to produce Chloroprene. The Vinylacetylene required for above reaction is prepared by Dimerization of acetylene by passing it through an aqueous solution of Ammonium Chloride and Cuprous Chloride at K. The Chloroprene obtained undergoes Polymerization to gives Neoprene. Though no specific catalysts are needed for this process but the polymerization becomes faster in the presence of Oxygen or peroxide. Polymerization of Chloroprene is times faster than Isoprene. Uses of Neoprene It is used in the manufacture of hoses, gaskets, shoe heels, stoppers, conveyor belts and printing rollers etc. It is also used as an insulator. Properties of Bunaâ€"S It is very tough and a good substitute for natural rubber. It possesses high abrasion resistance. It has high load bearing capacity. Uses of Bunaâ€"S It is used for manufacturing automobile tyres. It is used for making floor tiles, footwear components, cable insulation etc. Thiokol Thiokol is prepared by copolymerization of 1, 2 â€" dichloroethane ethylene dichloride with Sodium Tetrasulphide Na_2S_4 in presence of Magnesium hydroxide. Thiokol is also known as polysulphide rubber.

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Softness of natural rubber increases with the increase in temperature while brittleness increases at low temperature. Therefore, ideal temperature for using Rubber is â€” K where its elasticity is maintained. Other properties which decrease the quality of natural rubber are: The properties of Natural rubber can be improved by a process called Vulcanization. Vulcanization is the process of introduction of Sulphur bridges between different chains by heating raw rubber with Sulphur at K. In the absence of catalyst the process of vulcanization is slow. Some additive such as Zinc Oxide is added to accelerate the rate of Vulcanization. Difference between Vulcanized rubber and Natural rubber The new or vulcanized rubber obtained has properties that are just opposite to that of natural rubber. These properties are Vulcanized rubber has excellent elasticity. Low water absorption tendency It is resistant to the action of organic solvents It is resistant to attack of oxidizing agents. Vulcanized Rubber is an improved form of Natural rubber. In vulcanized rubber, Sulphur bridges are introduced either at their reactive allylic sites or at the site of double bond. The presence of these cross links increases the toughness, strength and hardness of rubber. Due to the presence of Sulphur bridges, individual chains can no longer slip over one another but are locked together in a giant size molecule. Cross-links being formed between the rubber polymer chains during Vulcanization Note: Amount of Sulphur used for vulcanization process determines the extent of hardness or toughness of the rubber. The process of Vulcanization was discovered by Charles good year in