

Chlor-alkali for a healthier Europe

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Making everyone feel better using a vital chemistry

Chlor-alkali chemistry plays a key role in the majority of modern medicines but it also has other critical health-related functions. From clean drinking water and products that help to disinfect our communities to life-saving materials; chlor-alkali chemistry is indispensable.

Keeping you healthy for over a century

Chlorine, caustic soda/ caustic potash and hydrogen (collectively known as chlor-alkali) have been used for over 100 years to keep people healthy.

One of the original uses of chlor-alkali was in the production of soap. Here, sodium hydroxide (caustic soda, also known as 'lye') is carefully mixed with fats and oils (such as olive, soybean and coconut oil) to make this important 'cleaning' product. Whilst none of the sodium hydroxide remains in the final product it plays a key role in starting the process. Potassium hydroxide (caustic potash) is in a similar function for liquid soaps.

Chlor-alkali chemistry helps to make soap to keep us all healthy



However, this is only one small part of chlor-alkali's role in keeping society healthy. Chlorination has been used to remove harmful microorganisms from water for decades also. One of the first reported uses of chlorine to disinfect drinking water was in 1897, when it was used in Kent (UK) after an outbreak of typhoid. Typhoid is a bacterial disease that can be spread by drinking contaminated water and lead to fever, diarrhoea and, in severe cases,

death. When carefully applied, chlorination can help to control the microorganisms responsible for cholera, dysentery, hepatitis and more. It can also help to control strange tastes and colours on the water as well as to remove metals such as iron and manganese.

This chemistry also plays a role in the careful disinfection of swimming pool water. When bathers enter the water to cool off, they bring with them cosmetics, deodorants, sweat and more. Additionally, and as accidents can happen, urine and faeces are also sometimes brought into the pool by swimmers. Finally, bathers are also a source of bacteria and viruses, all of which can make people unwell if they mistakenly drink the pool water. As such, chlorine chemistry (such as sodium hypochlorite or 'bleach') helps to keep the pool water healthy by removing any harmful microbes. This chemistry is so effective that you can use it to clean your home with. As good as this chemistry is though, it is always recommended to shower before swimming to remove anything that you wouldn't want in your pool and you should never swim when you feel ill!

Keeping pools healthy with chlor-alkali



chemistry

Chlorine chemistry also plays a role in the plumbing that safely carries water into your home. PVC (polyvinyl chloride) produces strong, long-lasting pipes that do not rust when they are in the ground. These pipes are so durable that they can be in use for over 50 years. Further they can be recycled at their end-of-life adding to their sustainability.

What critical role does chlor-alkali chemistry play in modern medicine?

Approximately 88% of modern medicines rely on chlor-alkali chemistry in their production. Whilst many (around 75%) of these do not contain chlorine in their final product, chlor-alkali still plays a role. Chlorinated solvents are one such example. Many medicines are produced in a solution and so chlorinated solvents are useful here as they are easily removed at the end of the process. Other chlorine-containing chemistries help by stabilising the reaction or by helping to carry the 'active' substance to the right place in the production process at the right time. Other chlorine chemicals such as hydrochloric acid (HCl) help to stabilise the acidity of the medicine.

Making modern medicine with chlor-alkali chemistry



Medicines such as those to treat ulcers, depression, high cholesterol, arthritis, asthma, HIV and more all rely on chlorine chemistry in their production. Additionally, novel cancer treatment medicines are being tested based on chlor-alkali chemicals. Aspirin is also made using chlor-alkali chemistry. Here, sodium hydrox-

ide reacts to produce the active, pain relieving, ingredient (sodium acetylsalicylate).

All of these medicines need to be able to be stored until used and chlorine chemistry can play a role here too. PVC is used in the blister packs to extend the shelf life of these important, potentially life-saving, products.

PVC is also vital in another medical area; safe blood bags. More than 110 million blood transfusions are performed each year to help treat things such as anemia, cancer or to provide blood during emergencies. Since the 1950s, doctors have relied on lightweight, lower cost, sterile PVC-based blood bags as they can store blood for up to 49 days without breaking.

PVC is so versatile that it is also found in other medical applications such as medical tubing, oxygen masks and in prosthetic limbs.

Other chlor-alkali chemistries are also found in hospitals including polyurethane in balloon pumps to help hearts to pump more blood. Also, whilst not found in the final product, sodium hydroxide is involved in the production of nylon which is used to make nylon's strong, layered structure and make it 'stretchy'. Nylon is used to make sutures and can even be used outside of the hospital to make toothbrushes.

Chlor-alkali also found a role in the recent pandemic. Here, chlorine was used to purify the borosilicate glass tubes that were used to store and transport Covid-19 vaccines around the world.

Read more about chlor-alkali at www.eurochlor.org.

