

Chlorine gives us clean pools, tennis rackets, prescription drugs and a lot more. But it's also linked to cancer and environmental harm.

By: Roy Rivenburg, Times Staff Writer

On the summer smell-o-meter, chlorine is up there with barbecue smoke, coconut suntan oil and night-blooming jasmine as a sure sign of the season.

In liquid and tablet form, it is synonymous with swimming pools, bloodshot eyes and green hair. But chlorine's summer connection doesn't stop there. It's also an essential ingredient in the manufacture of surfboards, beach umbrellas, hay fever medicine, tennis rackets and sunscreen.

According to the Chlorine Chemistry Council (not to be confused with the World Chlorine Council, the Canadian Chlorine Coordinating Committee or the Chlorine Institute), chlorine is an ingredient or plays a role in the manufacturing of more than 10,000 products.

It's also secreted by Lone Star ticks (as a sex pheromone), Ecuadorean frogs (as a painkiller that is 500 times more powerful than morphine) and Hawaiian volcanoes.

But the chemical has a nasty side. Environmentalists consider it one of the most dangerous substances on the planet. Chlorine and its offspring (dioxin, chlorofluorocarbons, chlordane pesticide) have been linked to cancer, ozone-layer depletion and other ills.

Many swimmers aren't that crazy about the stuff either.

Brian Murphy, a Santa Monica architect who started swimming competitively at age 5, remembers barbers constantly telling him, "Your hair feels like plastic."

Other pool-aholics blame chlorine for disintegrating swimsuits, green-tinged hair (suggested remedies range from Alka-Seltzer rinses to clarifying shampoos) and burning eyes.

The last accusation is a bum rap. Eye irritation is actually caused by chloramines, which form when chlorine reacts with sweat, urine or other contaminants.

Chloramines are also the real source of the so-called chlorine odor in pools. One swim veteran says he won't go near a pool when the chlorine stench is strong because he knows it means the water isn't 100% sanitary.

The cure is "shock treatment," in which a megadose of chlorine is added to burn away the chloramines.

For most people, however, the chlorine scent conjures positive feelings. A 1991 survey

by the Smell & Taste Treatment and Research Foundation cited chlorine's smell as a trigger for happy memories of childhood.

"Most of the time when people smell chemicals, they view them negatively," says Dr. Alan Hirsch, the Chicago-based foundation's director. "But chlorine is viewed in a positive light — because it reminds people of swimming."

(Other smells on the nostalgia list included crayons, fresh-baked cookies, Play-Doh and jet fuel — except among people born before 1930, who favored natural odors, such as pine, hay and horses.)

In its natural state, chlorine is a greenish-yellow gas. Discovered by a Swedish pharmacist in 1774, the substance remained unnamed until 1810, when an English chemist suggested "chlorine," after the Greek word for green, *khloros*.

In 1846, it debuted as a hospital germicide in Vienna. From there, it has become one of the world's most effective disinfectants. According to the Chlorine Chemistry Council, the secret to chlorine's cleaning power is "its ability to bond with and destroy the outer surfaces of bacteria and viruses."

It's also cheap to produce. Simply run an electrical current through salt water (which contains sodium chloride) and *voilà*: The sodium and chlorine ions go their separate ways.

Today, chlorine compounds are ubiquitous. Deodorants, pacemaker batteries, guitar strings, toothbrush bristles, perfumes, X-ray film, mattresses, bicycle seats, PVC water pipes and hundreds of other products rely on "chlorine chemistry."

It is also used to pickle steel for automobiles, bleach paper, purify the silicon used in computer chips and produce 85% of the world's pharmaceuticals. North America produces 12 million tons of chlorine a year.

But in recent years, chlorine has come under attack from environmental groups, which want to phase it out of existence.

Although the alternatives are typically more expensive, they're much safer, says Rick Hind of Greenpeace. For example, oxygen can be used to bleach paper. "You never have to run from an oxygen cloud," he says.

Even the TV show "Seinfeld" took a swipe at chlorine in one episode. After looking at an ugly baby, Jerry remarked, "A little too much chlorine in that gene pool."

To defend itself, the chlorine industry has launched several educational councils to tout the chemical's "natural" properties.

Publicity materials note that chlorine is found in human stomachs (hydrochloric acid),

seaweed (which sometimes produces chloroform), volcanic eruptions (methyl chloride) and assorted critters (German cockroaches manufacture chlorinated steroids to help in food-gathering).

"Chlorine is one of those double-edged swords," says Steve Terry, senior editor of Pool Science magazine. "It provides benefits, but at a cost. Ever since it was introduced to drinking water supplies [as a disinfectant], incidences of typhoid and cholera have disappeared. But chlorine is carcinogenic. So, do you want cancer when you're 85 or typhoid when you're 25?"