



TECHNOLOGY NOTES

SecureAire's ACS System and Chloramines

The SecureAire Advanced Collector System (ACS) is a very efficient and effective air purification system. It is composed of three parts, a Particle Conditioning System, a Collector System and a Collider System. These three parts together create an efficient and effective particle control entity.

The ACS optimizes both ionization and polarization to collect small particles, TVOCs and gases very effectively. Unlike conventional filters the ACS, with its electronic characteristics, exhibits superior performance in reducing and or removing the above contaminants. The ACS conditions contaminants to adhere to the media material or other particles, which subsequently adhere to the media material and get captured. Utilizing and optimizing electric fields and charge to ionize/polarize contaminants as well as polarize the internal media material in the system, results in a significant reduction in the above contaminants.

In the past Particle Accelerated Collision Technology (PACT) was created to agglomerate particles, as well as condition particles to adsorb and absorb gases and odors in the room environment. These particles agglomerates were then brought back to the HVAC filter where they were captured. PACT was utilized to make any filter more effective.

The operation of the ACS Collider section performs the same function. However, by combining the Collider with the PCU and Collector, the ACS System not only agglomerates but, very effectively collects these particles, gases, TVOCs and odors.

Chlorine molecules can combine with ammonia and nitrogen compounds in the water to form chloramines. Chloramines are formed any time ammonia and nitrogen are in the water. Some of the ammonia and nitrogen compounds are introduced into the water by swimmers and bathers in the form of perspiration, urine, saliva, sputum and fecal matter. An active swimmer sweats one pint per hour, while the average person sweats three pints per hour in a heated spa.

Chloramines, or combined chlorine smell bad, they are eye and skin irritants, and they get in the way of free chlorine trying to do it's job. When a pool smells strongly of Chlorine, what smells is not free available chlorine, but Chloramines.

Chemistry and Understanding

A Chloramine is formed when chlorine is combined with ammonia and one or more hydrogen atoms are replaced by chlorine atoms or:



Ammonia gas combined with Chlorine gas forms Chloramine and ammonia salt.

In chemistry the electrons in the outer bond creates the properties of molecules that are formed. For simplicity to be stable an atom wants two or eight electrons in its outer shell, depending on the atom. For example Hydrogen (H) has one outer electron. That is why H₂ is more stable than H in nature. Chlorine (Cl) has 7 electrons in its outer shell. Cl₂ is more stable than Cl, see figure 1.



Cl has 7 electrons in its outer shell (it wants 8).



When 2 Cl atoms come together they form a stable molecule by each sharing an electron making 8 in each atoms outer shell

Figure 1: The forming of Cl₂.

If a Cl replaces an H in the ammonia molecule you end up with Chloramine. Of course two or three Cl can replace the H atoms to form different forms of Chloramine.

Figure 2 shows a simplified process of how a Chloramine is formed (without getting in salt formation and using 2 molecules of ammonia or chlorine).

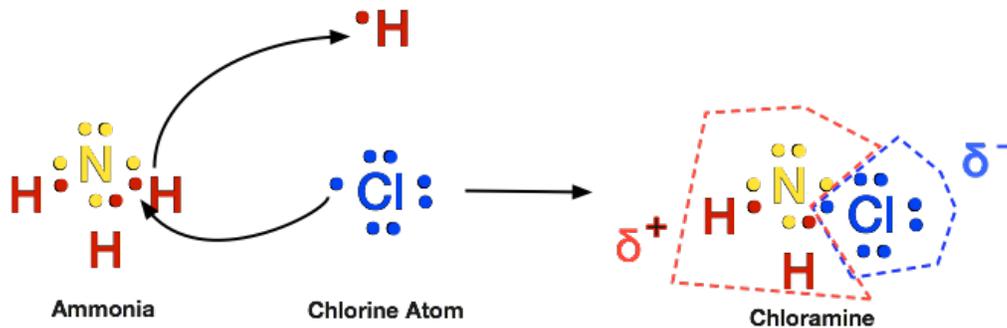


Figure 2: Simplistic view of how Chloramine is formed from Ammonia and Chlorine.

When atoms form molecules and share electrons they can become slightly positive on one end of the molecule and slightly negative on the other end. When this occurs a polar molecule is formed. Looking at Chloramine, even though the molecule is neutral in charge, the Cl end of the molecule has more electrons associated with it, so it is more negative. The NH₂ end is more positive. Figure 3 shows the polar molecule. The symbol for the slightly negative end is δ^- and slightly positive is δ^+ .

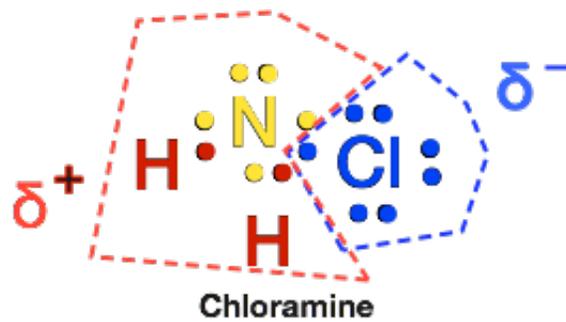


Figure 3: Chloramine is a polar molecule.

Since Chloramine is a polar molecule it is very susceptible to combining with other particles in the air.

The simple principle of creating polar molecules or creating a charged particle is the basis for SecureAire's Technology Platforms. The ability of SecureAire's ACS System to treat Chloramine contamination is no different than previously documented case studies where the removal and reduction of TVOC's, dissolved gases, smoke, odors and particles has been achieved. SecureAire's Technology is "non selective", which means that the source of the airborne contaminant is treated the same.

If a pool generates a copious amount of Chloramines, sufficient airflow and utilizing the SecureAire ACS System will help to reduce and or remove the amount of Chloramines in the occupied area.

For further information, please feel free to contact your local SecureAire Representative.