How to Compare the *Water O_3zonator* to Other Units

A common comparison when comparing the Water Ozonator to other ozone generators is to compare how the ozone itself is produced. There are three common methods used to make ozone: Ultraviolet (UV) Light, Cold Plasma and Corona Discharge. The SOTA Water Ozonator uses Corona Discharge.

Ultraviolet (UV) Light The use of ultraviolet or UV light to make ozone mimics the process that takes place in the ozone layer. Air is introduced to a chamber with UV light source (lamp). UV light has a wavelength of 235nm – this is also the same wavelength at which oxygen can readily be split from O_2 into O-. These unstable atoms combine to form O_3. UV light targets oxygen. For this reason, it is an excellent method. In addition, there is zero NOx created. The wavelength to disassociate Nitrogen is different than that supplied by the UV lamp. As a result, Nitrogen is not available to combine with the O- atoms. This is the preferred method for making ultra pure ozone. Units can be both air and oxygen fed.

As a disadvantage, the minute you turn a UV unit on, you start to lose power, as the UV light output immediately starts to diminish. As a result, inconsistent ozone concentrations are created. Also, the ozone concentration is generally low. In order to get high concentrations, the unit needs to be large and bulky (to accommodate a large UV light source) and generally does not lend itself to being very portable. As the UV bulb loses power, it will eventually need to be replaced. UV bulbs are expensive, adding to the overall cost of the unit. Finally, as a caution, make sure the UV light is shielded, as UV light can damage the eyes.

Both of the following methods use high voltage electricity to disassociate oxygen molecules to create ozone.

Cold Plasma Cold Plasma units use a glass on glass chamber to generate ozone. A glass electrode and a glass dielectric are contained within a larger chamber and separated by a small gap. The high voltage electrical charge is passed between the glass tubes, creating a "cold plasma". Air or Oxygen is then fed through this plasma, which disassociates the O_2 molecule. The low heat design (hence "cold plasma") is an advantage for this type of ozone production. Cold plasma units tend to have a long life. The ozone gas generated is very pure when using oxygen feed, due to no metal components in the ozone gas path.

Again, as with the UV method, ozone concentrations are generally low. Large cold plasma tubes would be needed to create the same ozone output as a Corona Discharge unit. As a result, the expense of the unit is increased and the portability of the unit is decreased. The glass components are hand blown, which increases the cost tremendously. Generally, Cold Plasma units are only oxygen fed, as these are high grade medical units.

Corona Discharge Corona Discharge units use a stainless steel electrode and a glass dielectric. A high energy plasma is created when a high voltage electrical field is passed between the two. This plasma creates ozone by disassociating the oxygen molecule. The Corona Discharge method produces a very high concentration of ozone for the size of the unit. This makes the unit very portable. Unique to the SOTA Water Ozonator is the fact that it is portable as it can be powered from a 12 VDC source, such as a car battery. This makes it very handy for emergency applications.

Corona Discharge units should not be oxygen fed because of the extreme ozone concentrations created. The high ozone concentrations may lead to the breakdown of the stainless steel electrode. Because of the use of a metal electrode, these types of units cannot be classed as medical grade, even if other components within the unit are considered to be medical grade.

One disadvantage with all high voltage ozone generators such as Cold Plasma and Corona Discharge is the concern regarding the production of oxides of nitrogen (NOx). These oxides are not usually an issue on units with an output of less than 300mg/Hr output. The SOTA Water Ozonator outputs 200mg/Hr and has been tested at an independent lab. Tests confirm that no oxides of nitrogen were created. Furthermore, no contaminants were found in the ozone gas, indicating no breakdown of the stainless steel electrode. To eliminate the creation of NOx in units with a greater than 300mg/Hr output, a pure oxygen feed should be used – this will eliminate the presence of nitrogen. However, pure oxygen should not be used on non-medical grade ozonators.

Finally, when comparing water ozonation units, it is best to know how the output is being measured and whether the value can be checked using standard testing equipment. The manufacturer should be able to provide you with the name of the testing equipment used and the equipment should be suitable for that purpose. Proper testing equipment is expensive –

it is reliable and accurate in the results that it provides. Less expensive equipment may give inaccurate results, which cannot be relied on.

The output of the SOTA Water Ozonator is measured with an Anseros Ozone-in-Air Ozone Analyzer, Model GM 6000-RTI. Ozone-in-Air provides an accurate and highly reliable ozone output reading. Measuring ozone using a titration method provides less reliable, artificially high ozone readings.

When comparing Water Ozonators, it is important to not only compare the electrical specifications of the units but also to compare any external testing, certifications or testing standards that the units have or have not met.

The SOTA units have been CE approved and are RoHS compliant.

CE is a European standard that ensures a product meets certain regulatory standards set by the European Union. Having CE on the units ensures products are safe to use and do not output hazardous levels of EMRs (electromagnetic radiation, like cellular phones do).

RoHS is the Restriction of use of Hazardous Substances and is again, a European standard. In order to be RoHS compliant, electronic products must not use any of the following six substances: Cadmium (Cd), hexavalent Chromium (CR VI), Lead (Pb), Mercury (Hg), polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE).

It is very important to make an informed and intelligent decision before purchasing any equipment. Be willing to ask the manufacturer for the test data. They should have this data readily available and be ready to share it.

In summary, the benefits of a well built Corona Discharge Ozonator for non-medical applications is its portability, ozone purity, ozone concentration, reliability and cost. For any medical grade applications, the money should be spent to purchase a medical grade ozonator. A non-medical grade ozonator should not be adapted for medical grade applications. There are no shortcuts.