

## Hidden Acids can harm! (Buffered acid discussion)

When looking for safe cleaners and chemicals to use on acid sensitive materials such as marble and limestone most of us rely on product labels or in some cases the litmus test to identify them. However in many cases labels do not always tell us the active ingredients or ph and the litmus test is also not reliable if you are testing a buffered acid. So what are buffered acids? The term seems to be on everyone's lips at present and yet no many actually understand the term. I have heard many a sales person give their opinion about them. It seems many believe they are a way of masking an acid so a company can sell something as safe when in fact it is not. In other words a marketing trick!

This is of course not true.

Solutions using a buffered acid are made for the reason of stability of performance. To understand this and how and what a buffered acid is we need first to fully understand the workings of the ph scale.

Ph scale is a measure of the concentration of hydrogen ions in a solution. It is a very important scale because hydrogen ions are positively charged and hence can alter the environment of other molecules in solution. By putting forces on other molecules these can change their shape. For example the shape of a protein in the body can change its function hence you can see how important the concentration of hydrogen ions is. The scale goes from 0 (acid, high concentration of positively charged hydrogen ions) to 14 (high concentration of negatively charged hydroxide ions). Therefore a substance that when added to a solution increases the concentration of hydrogen ions is called an acid whereas one that reduces the concentration of hydrogen ions is called an alkaline or base. Acids donate protons due to positive charge and alkalis or bases accept protons hence knowing the ph is important because proton acceptance or donation can create new compounds.

In some instances it is very important to maintain a stable ph. If the ph is not stable then protons can be lost or gained creating very reactive solutions. A good example is the blood in our body. Blood has a ph of

approx 7.4. It is very important that it maintains this ph. If it does not and goes either more acidic or base then the haemoglobin in our blood for example cannot pick up or deliver oxygen properly creating real problems with our health as you can imagine.

The substances that help to maintain a stable ph are called buffers. These are substances that resist changes in ph when small (not large) quantities of an acid or an alkaline are added to it. Acidic buffer solutions are made from a weak acid and its corresponding salt in equal proportions (molar concentrations). The only way to change the buffers ph is to change the ratio of acid to salt or by introducing another acid or salt.

An example in our body of a buffer that helps to maintain the important stable ph (so we don't have a highly reactive blood solution) is carbonic-acid-bicarbonate / a mixture of the acid and the salt. So there you have it. Buffers allow us to make solutions that have a stable ph and hence cannot easily donate or accept hydrogen ions which would otherwise make then very reactive and hard to control.

Armed with this information it is easy to see how a solution can test near neutral or even alkaline when tested with litmus paper but still contain acid. The importance of this is that buffered acid solutions can harm acid sensitive materials such as limestone or marble. When a buffered acid solution is exposed to a marble the calcium carbonate can be of a level that it creates an imbalance in the solution hence making it unstable and in doing so exposing the acid to the stone. The bottom line is that when using buffered acid solutions on acid sensitive materials it is always better to treat them as if they were acids in the normal sense.

I was asked by one of my customers if buffered acids were more difficult to neutralize than other acid solutions. Water is still the best as it is the fastest way to reduce the concentration of the solution. However buffered solutions do require a higher concentration of the neutralizing chemical because of their ability to resist small additions of acids and alkalis.

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In conclusion, buffers are used to create stable solutions resulting in more stable performance. They are not there as marketing tricks. Treat them with care especially around acid sensitive materials such as marble and limestone and if in doubt always test before using.

## Neutralising buffered acids

I was asked if there was a way of neutralising buffered acids without the use of water or a minimum of water. He also asked about the effectiveness of a neutral cleaner such as Concentrated Tile Cleaner in this process. My reply to him was as follows:

Any neutralizing has to include water. However if you want to chemically neutralize as opposed to just flushing with water then one of the best and easiest to access is Ammonia Hydroxide used around the 10z per gallon of water concentration.

The downside to this is it will create a toxic gas (chlorine gas) hence must be used cautiously and in well ventilated area. It is also the reason why we stick with recommending water by itself because both processes are wet. Also remember that neutralizing any acid with alkaline forms a salt. Therefore when not done correctly you can give the customer a salt problem not initially anticipated. Hence any chemical neutralizing still uses a lot of water.

As for the use of Concentrated Tile Cleaner in the neutralizing process? I like recommending this. It does not chemically neutralize the acid because it is pH 7 and hence cannot accept hydrogen ions which it would need to do to neutralize. However containing good surfactants it does a great job of removing any acid that may have started to dry and crystallize on or in the pores of a stone, tile or grout joint.

**For more information contact**

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## Product of the Month



### Phosphoric Acid Cleaner

#### Concentrated Acid & Cleaner

- Removes light grout smears, mineral deposits, rust stains and efflorescence
- Also effective for removal of most hard water stains, lime deposits and soap scum.



Technical Bulletin



MSDS

#### Recommended for:

- Masonry Surfaces and Acid resistant Tile and Stone.

#### Available in:

- 1 Litre • 4 Litre • 19 Litre