

# Thanks to

# KATALYST-LIGHT

## Achieving Alkalinity to Treat Water Problems and Health Problems

Presentation 3

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## Introduction:

The world water includes low pH groundwater. The low pH groundwater are acidic and contains significant metals like iron, manganese, aluminium, chromium, nickel, copper etc. and sulfate contamination including hydrogen sulfides. Low pH groundwater using Katalyst-Light® technology to split **H<sup>+</sup>** and **OH<sup>-</sup>** ions can solve these problems and has huge potential though the use of Katalyst-Light®.

Due to the pH increase created by the water hardness, the predominant carbonate species exiting the  $\text{CaCO}_3$  are approximately equal amount of

Carbon dioxide ( $\text{CO}_2$ )

And

Bicarbonate ( $\text{HCO}_3$ )

Once again

- Hardness consists mostly of Calcium Carbonate ( $\text{CaCO}_3$ )
- As the low pH groundwater enters the limestone, the limestone dissolves by the following reaction producing calcium and carbon dioxide and increasing the pH into the range of 5 to 6.

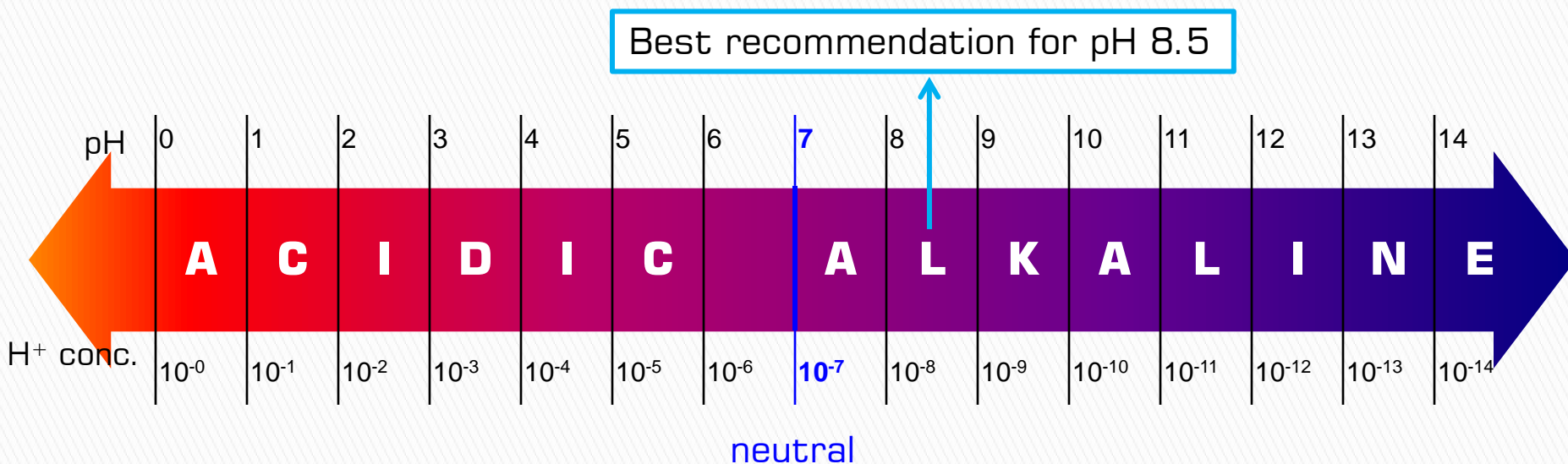
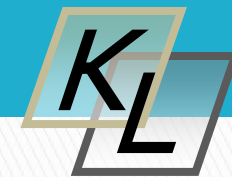


- The pH presented in fig 1. above the arrows  $\leftrightarrow$  represent the pH at which equal amount of each species is present



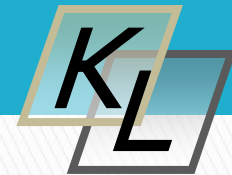
So losing  $\text{CO}_2$  from water will increase the pH *(more on slide 14).*

# “The pH Scale”



The pH of water, by itself, has no “teeth” unless it has  
“**BUFFERING CAPACITY**”

# Misconception!



You can drink water with a pH less than 7

That can neutralize more acid than water with a pH of 10!

That's how un-intuitive this subject is and the reason why people in Water Treatment are confused!

# Alkalinity



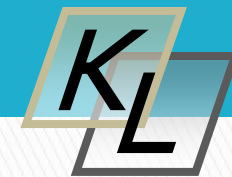
High pH in water with accompanying ALKALINITY



“does a lot and save money”

Even when the pH of water is very high<sup>11</sup> it can lack sufficient ALKALINITY

# Alkalizing Minerals



## ALKALIZING MINERALS

Alkalizing Minerals make it impossible to bring the pH down.

Without using  $\text{HCO}_3^-$  ———  $\text{CO}_3^-$  ———  $\text{OH}^-$  (Electrons)

Katalyst-Light® split **Cations**<sup>+</sup> (Protons) and **Anions**<sup>-</sup> (Electrons)

	Cations (Protons)		Anions (Electrons)
$\text{H}_2\text{O}$	$\text{H}^+$	and	$\text{OH}^-$
$\text{H}_2\text{CO}_3$	$\text{H}^+$	and	$\text{HCO}_3^-$
$\text{CaCO}_3$	$\text{Ca}^+$	and	$\text{CO}_3^-$

- and adds **ALKALINITY** to the water and raises the pH.

# Alkalinity



The splitted ions from the acids the  $\text{Fe}^{2+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Al}^{3+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Pb}^{2+}$  are protons and joining them with hydroxide to use the ALKALINITY example

Cations (Protons)		Anions (Electrons)	
$\text{Fe}^{2+}$	and	$\text{OH}^-$	$= \text{Fe}(\text{OH})_2$
$\text{Cr}^{6+}$	and	$\text{OH}^-$	$= \text{Cr}(\text{OH})_6$
$\text{Ni}^{2+}$	and	$\text{OH}^-$	$= \text{Ni}(\text{OH})_2$

Reduction of Cr(VI), TCE, U, As(III) and As (V), TC,  $\text{HNO}_3$  with ZERO VALENT Ion (Presentation VI).

Note: Borates – Silicates – Phosphates also contributes to the Alkalinity

# Alkalinity

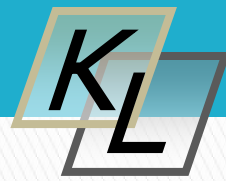


Water rich in Carbonates, bicarbonates and hydroxides including borates, silicates and phosphates contributes to ALKALINITY

**THESE HAVE BUFFERING CAPACITY !**

ALKALINITY is the water capacity to resist changes in pH that would make the Water more acidic and acidic water causes Cancer !

# Alkalinity: Human Health



All users of Katalyst-Light® in Low Mineral Areas using

- Surface Water
- Well Water
- Ground Water

...have less pH, less Alkalinity & the water is acidic.

**“Cancerous Tissues are Acidic, whereas healthy tissues are Alkaline”**

Katalyst-Light® splits Water into **H<sup>+</sup>** and **OH<sup>-</sup>** ions

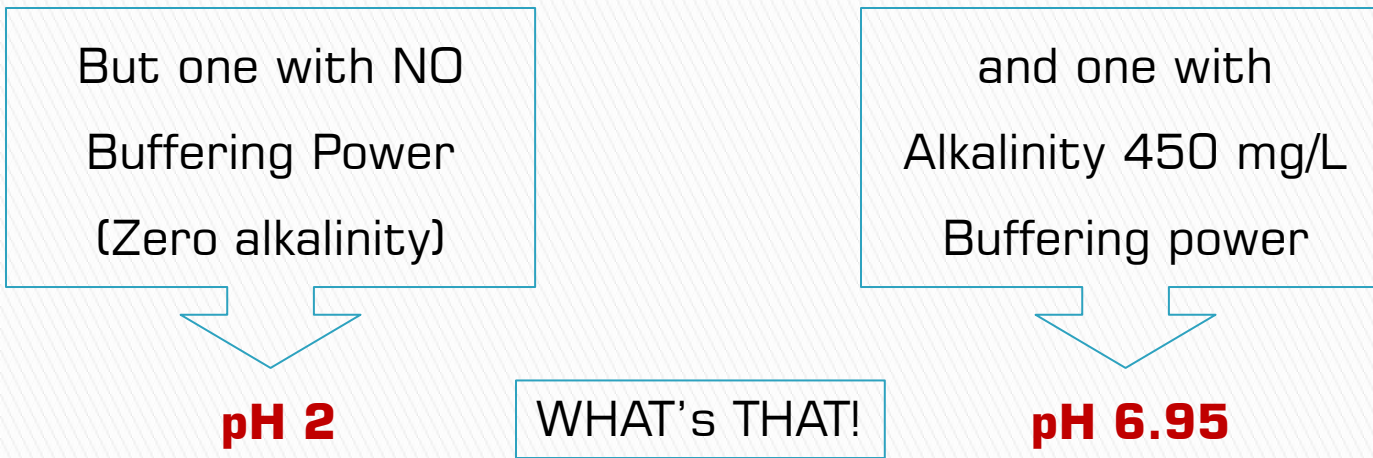
- If there is an excess of **H<sup>+</sup>** it is acidic
- If there is an excess of **OH<sup>-</sup>** it is alkaline

– Dr. Otto Heinrich Warburg (The Real Cause of Cancer)

# Buffering Capacity

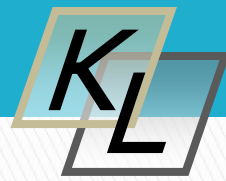


For example, if you add the same weak acid solution to two vials of Water – both with pH 7



The pH of Zero Alkalinity water will immediately drop while the pH of the buffered water will barely change at all.

# Contribution to Alkalinity



Chemical Species	Relative contribution to Alkalinity
$\text{HCO}_3^-$ - Bicarbonate	89.8
$\text{CO}_3^{2-}$ - Carbonate	6.7
$\text{B(OH)}_4^-$ - Borate	2.9
$\text{SiO(OH)}_3^-$ - Silicate	0.2
$\text{MgOH}^+$ - Magnesium monohydroxylate	0.1
$\text{OH}^-$ - Hydroxide	0.1
$\text{HPO}_4^{2-}$ - Phosphate	0.1

Carbon dioxide -  $\text{CO}_2$  in water – *continues...*

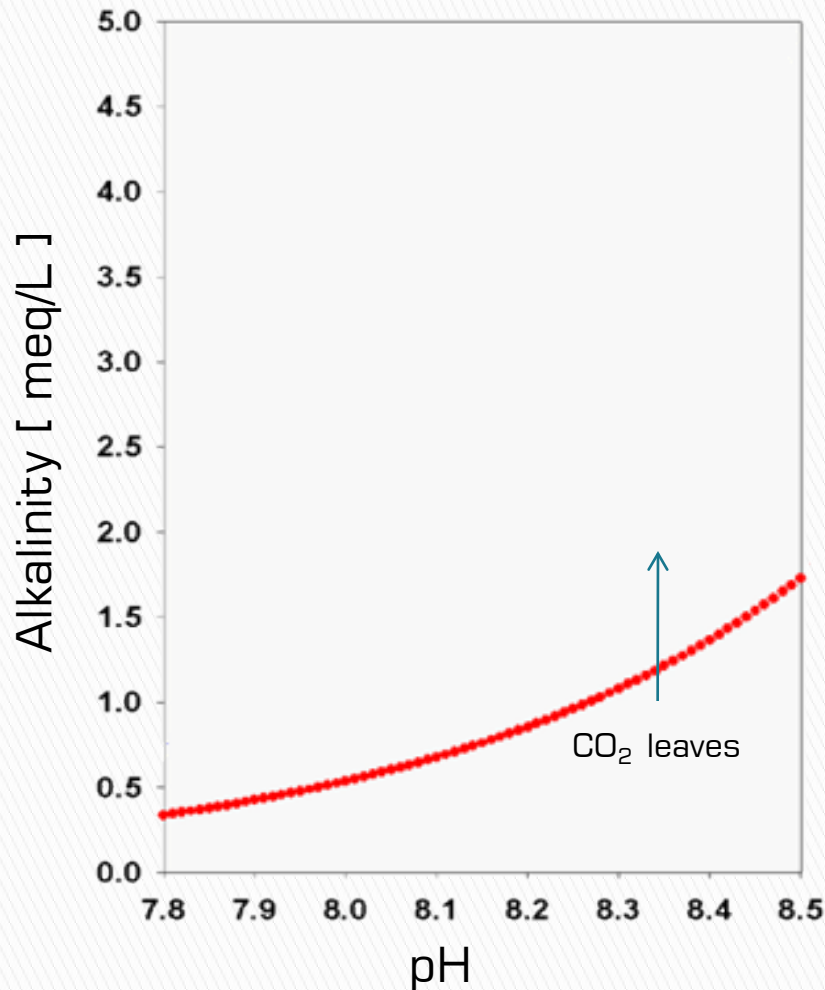
# Carbon Dioxide (CO<sub>2</sub>)



Carbon dioxide has a specific solubility in water as carbonic (H<sub>2</sub>CO<sub>3</sub>). At any given pH there is an exact mathematical relationship between H<sub>2</sub>CO<sub>3</sub> and both BICARBONATE and CARBONATE

**For example:** At a pH of about 9.3 in freshwater, the carbonate concentration is 100 times more than that of Carbonic acid. At higher pH this multiplier rises and there is consequently more bicarbonate and carbonate present.

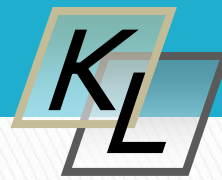
# Theoretical Relationship



## Important to know:

Water with high  $\text{H}_2\text{CO}_3$  (bicarbonate) is the healthiest water to drink. It is critical to see that alkalinity does not depend strictly on pH. pH measures the degree of alkalinity but not the quantity.

# Theoretical Relationship



The ultimate water treatment system is water treated with Katalyst-Light®. We are now in a stage to prove of our Katalyst-Light® Technology, with achieving great results.

Katalyst-Light® demonstrated that the production of **pure hydroxide ions** from water is an environmentally friendly way, including using **POWER OF GAMMA MANGANESE** as a Catalytic Source. - This process is called **Waterlysis**.

“LYSIS” means taking apart or splitting.

Thank you for reading!