

PH & CHLORINE – A HANDS-ON LOOK AT DRINKING WATER FUNDAMENTALS

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ATLANTIC PURIFICATION SYSTEMS

Company Profile

- Atlantic Purification Systems Ltd. is a family owned business, successfully serving the municipal, industrial and commercial markets in Atlantic Canada since 1970. Representing quality manufacturers, APS provides and supports innovative solutions for water and wastewater (systems and analytical equipment), pumps and fluid handling, paint spray and sandblasting, industrial air & filtration, and wholesale water conditioning.

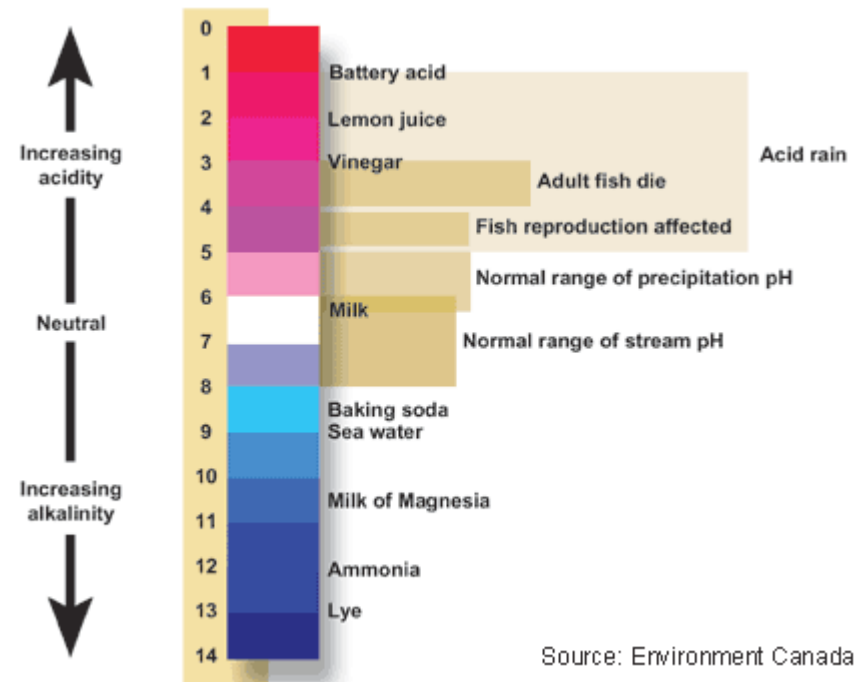
Mission Statement

- Our mission is to honour a tradition of Quality, Integrity & Performance when serving the needs of our markets in Atlantic Canada. These guiding principles will continue to be the driving force behind the success of the company, its employees and the customers we serve.



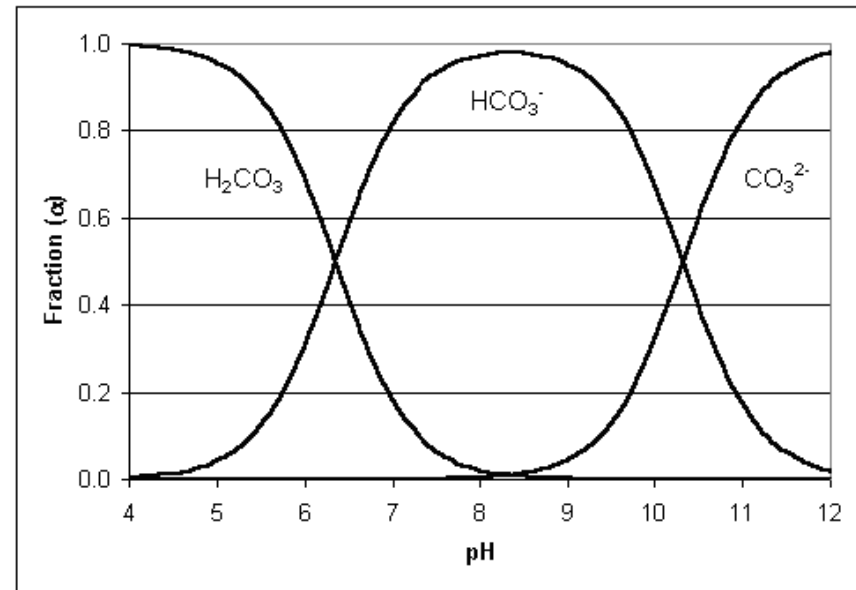
PH

- The pH of a solution is the negative common logarithm of the hydrogen ion activity:
 $\text{pH} = -\log (\text{H}^+)$.
- In dilute solutions, the hydrogen ion activity is approximately equal to the hydrogen ion concentration.



PH

- The pH of water is controlled by the carbon dioxide–bicarbonate–carbonate equilibrium system.
- An increased carbon dioxide concentration will therefore lower pH, whereas a decrease will cause it to rise.
- Temperature will also affect the equilibria and the pH. In pure water, a decrease in pH of about 0.45 occurs as the temperature is raised by 25 °C. In water with a buffering capacity this temperature effect is modified.
- The pH of most raw water lies within the range 6.5–8.5.



<http://joannenova.com.au/2011/11/the-chemistry-of-ocean-ph-and-acidification/>



PH & CORROSION

- The Canadian Drinking Water Guidelines indicate drinking water should be discharged between a pH of 6.5-8.5.
- Some water treatment plants keep their pH about 7 to reduce corrosion and pitting in the distribution system.



<http://www.envirologics.ca/tomahawk>



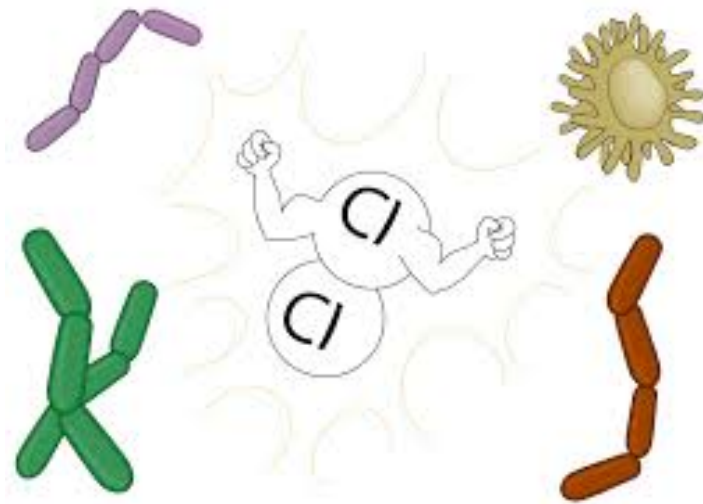
CHLORINE: FREE vs. TOTAL

- Free chlorine refers to both hypochlorous acid (HOCl) and the hypochlorite (OCl⁻) ion or bleach, and is commonly added to water systems for disinfection.
- Free chlorine is the amount of chlorine available for disinfection.
- Total chlorine is the sum of free chlorine and combined chlorine. The level of total chlorine will always be higher than or equal to the level of free chlorine.



CHLORINE AS A DISINFECTANT

- Chlorine is one of the most widely used primary disinfectants for drinking water. It is present in most disinfected drinking-water at concentrations of 0.2–1 mg/litre.
- Free chlorine concentrations in most Canadian drinking water distribution systems range from 0.04 to 2.0 mg/L.



http://www.waterhelp.org/slide_artwork/226_chlorine_reactions_with_impurities_fin.png



CHLORINE & DISINFECTION BY-PRODUCTS

- Disinfection by-products are chemical, organic and inorganic substances that can form during a reaction of a disinfectant with naturally present organic matter in the water.
- The main DBP when using chlorine are Trihalomethanes (THMs) that have a MAC of 0.100mg/L as per the Canadian Drinking Water Guidelines.
- THM and other disinfection by-products have been proven to be harmful to humans.



LETS DO SOME TESTING!



QUESTIONS?



<http://digital.guide/get-google-adsense-account-back/20060/>



REFERENCES

- http://www.who.int/water_sanitation_health/dwq/chemicals/en/ph.pdf
- [Canadian Drinking Water Guidelines](#)
- <http://www.hach.com/DisinfectionSeries03>
- <http://www.lenntech.com/processes/disinfection/byproducts/disinfection-byproducts.htm#ixzz42RCtKXh6>

