Pool chemistry: acid-base eqilibrium flashcard

Pool Chemistry: Acid-Base Equilibrium The domestic home swimming pool can harbor many different microbes of bacteria's and algae. Checking the pH and chlorine levels daily will help prevent any of these occurring. Algae can clog filters or pollute the water and bacteria can become a serious health risks to the swimmers. PH is the figure expressing the acidity or alkalinity of a solution on a scale of O to 14, with 7 a neutral zone. Each figure above 7 is more basic (alkaline) and below 7 is more acidic.

The pH levels in water total the overall acid-alkalinity balance. When it is either too alkaline or too acidic, the chemical reactions that may come of it can be detrimental. If the levels are too acidic, it can corrode metals, leave impressions on surfaces and can even cause skin irritations. When the water become too alkaline, it can cause scaling on surfaces and plumbing.

Furthermore, either the pH levels being too high or low can alter the effectiveness of water and chlorine In water.

The same general cleaning agent bromide can also be used but with slightly different results (pH Levels, Tim Harris) The liquid chlorine sold for use in home pool is a solution of sodium hypochlorite, Nasal. Dry chlorine is solid calcium hypochlorite Ca(solo)2. When these ionic compounds are added to water, they undergo hydrolysis to form the weak acid, hypochlorite acid, HOC. COCO + H2O + OHO Chlorine is gas form, CO, also forms a hypochlorite acid when it is added to water, although, this method is more commonly used in larger public swimming pools.

CO + H2O + H+ + HOC For proper pool maintenance, enough hypochlorite acid must be present in the water.

Preventing growth of the common bacteria and algae. The amount of undomesticated hypochlorite acid depends on the pH levels. If the pH is too high, the hydrolysis reaction shown in the first reaction will be towards the reactants, according to the Electrifier's principle. If the pH may be too low it can cause skin or eye irritation from the acid content. When the pH levels are too high, adding an acid can lower it.

This will neutralist the excess hydroxide ions.

Mercuric acid (solution of HCI) or a solid sodium hydrogen sulfate is recommended. HCI + OHO H2O +CO 2- Nashua + OHO O An+ + ASS + H2O If the pH levels are too low, neutralizing some of the acid can raise it. Sodium carbonate (soda ash) or sodium bicarbonate (baking soda) can be used Niacin + AH 0 Ana + H2O + CO Enhance+H An + H2O + CO A noticeable problem that may occur with hypochlorite acid is that it can degrade if it is exposed to high ultraviolet light from the sunrays, combining with other chemicals and forming new compounds.

Chlorination that are used in pool chemistry forming a stable compound that will not degrade as easily. OIC- + VIVO 2 CLC- +02 (g) 2 HOC- + VIVO 2 HCI + 02 (g) the exposure to sunlight and how large amount of chlorine are lost to photolysis reactions.

With hypochlorite acid (HOC) and hypochlorite ion (OIC-) as the main pool cleaning agents on killing algae and bacteria. When added to the water, the equilibrium becomes present among a strong oxidant and weak ion: H2O + HOC HUH+ + OIC- When the equilibrium is reached in this reaction the pH levels are very sensitive to change between pH 7 and 8.

Hypochlorite negative charge obstructs the passage through the cell bacterial membrane, then hypochlorite acid becomes the preferred hooch of species in oxidation. (Source: Janet Grace, Intro to Pool Chem.

.) Acid-Base Indicators Measuring pH using an acid-base indicator is using a weak acid or base, in its are titrated when are present of indicators which change very slightly in alkaline conditions. The same goes for weak bases being titrated in the presence of indicators, to have only a slight change but under acidic conditions.

Using an acid-base indicator, it will change color to signal the end of the particular titration. When selecting the right indicator, if done right it can be most successful with little percentage error.

It has been chosen the three most suitable indicators and their color changes for this experiment are: – Biorhythms Blue (Yellow, Green, Blue) – Phenol Red (Yellow, Orange, Red) – m-Introspection (Light Yellow, Dark Yellow) These indicators have been chosen because they are within a certain range of the pH scale. As swimming pools are most comfortable at pH 7. 4. 0 1 is taken from either side of the 7.

, and the indicators are chosen to be mostly between 6. 4 to 8. 4 PH. An example using Biorhythms Blue: peak(Biorhythms Blue) 0 1 = 7 1 A color change will be visible at: Hal C] H+ + Len- = 1/10 Therefore pH = peak + peak – 1 or Buffers A buffer is an aqueous solution that has a highly stable PH.

If you add acid or base to a buffered solution, its pH will not change significantly. Similarly, adding water to a buffer or allowing water to evaporate will not change the pH of a buffer. How does buffering work? Supposedly containing high amounts of a weak acid (HA) and its conjugate (A-).

Since weak acids show the best source of protons, hydroxide ions are added into the solution to give the following: OH- + HA + H2O In the end, this equation shows that OH- ions are unable to build up and are replaced by A- ions.

If hydrogen ions are added to a buffer, the base and buffer together will neutralize (or the acid and buffer will neutralize the hydroxide ions). These reactions do not have a major effect of the overall pH levels so it can be used to slightly alter the pH find an acid that has the most similar values of the peak and the desired pH level.

It will provide the buffer with nearly enough amounts of acid and conjugate to neutralize as much H+ and OH- as possible. Total Alkalinity is the measure of carbonates, bicarbonates and hydroxide in water.

The standard range is a recommended 60 to 200 pump. Low total alkalinity can have a Seibel destructive effect on surfaces and paints of pools. PH levels will become very unstable, even the slightest chemical change can alter a whole shifts in PH.

The total alkalinity can be changed by adding a bicarbonate soda as a buffer, while adding acid will lower the total alkalinity. For example if the pH is stable but the Total Alkalinity is noticeably low. To raise the levels add sodium bicarbonate at the required rate, but this will also raise the pH because it is an alkali.

Hydrochloric acid or sodium phosphate used to lower pH will also lower the total alkalinity. To keep the levels balanced, artificially raise the total alkalinity so that when the acid is added the pH will lower itself to the acceptable level.