तेज़ाब से शरीर क्यों जल जाता है? ऐसा क्या होता है उसमें?

Answer by Rudrashis.

The damage done to our body when it comes in contact with a strong acid, in fact when it comes in contact withanyother highly-reactive chemical is because of the chemical properties of our skin and of the acid. More specifically, the damage is caused because of how the acid reacts with our tissues.It is actually a bit vague to say that such kind of damage is because of something that is there 'in' a corrosiveacid. Rather, the more accuratestep to take is to investigate what it does while taking part in a reaction with our skin.

Chemical properties of acids and skins

For the present situation we can use the following definition of acids (there are others as well): Acids are molecules or ions capable of donating a proton or hydrogen ion (H^+) in a chemical reaction. Such acids are called Brønsted acids, named after the Danish chemist Johannes NicolausBrønsted, who came up with this definition in 1923.

The release of hydrogen ions or protons is known as protolysis. Now if we know the concentration of the acid that took part in aprotolysisreaction, and can measure the concentration of the H^+ released during that reaction, then from calculating the ratio of these two values we can get a sense of how strong that particular acid is – an acid with a high ratio value will be stronger than an acid with a low ratio value. This actually means that stronger acids release more H^+ during their protolysis than that for weaker acids.

OK, so acids give out protons during their reactions. But does this have anything to do with their damaging effects on human bodies?

Yes, it does.

Well, one of the major building materials of our bodies is protein. For example, our skin is made of cells rich in proteins like keratin, which gives our skin structure and protection, and elastin and collagen, which keep our skin flexible. And

protons given off by acids damage the chemical structure of proteins and destroy their characteristic properties, mainly by disrupting the chemical bonds that give a protein its molecular conformation. This process is called denaturing of proteins. When a protein denatures, it loses its shape and thus its function.

How skin gets burnt

So, when skin is exposed to an acid it denatures and the cells die but don't exactly break apart. The result is a clear or white patch of skin that is no longer alive, but acts like a placeholder for once-living tissue. This process is called coagulative necrosis (coagulation is a process in which a liquid, especially blood, turns into a solid or semi-solid; necrosis is a form of cell injury which leads to the premature death of cells in living tissue, and is derived from a Greek word which means death, or the stage of dying, or the act of killing).

Although the formation of this ghost-like tissue might sound horrifying, it actually makes the burn less severe compared to burns with alkali chemicals. The dead tissue, called a coagulum, prevents the acid from reaching deeper tissues, making the burn more superficial.

But acids can damage tissue in several other ways than the one mentioned already.

Acids like sulfuric acid (H_2SO_4) and nitric acid (HNO_3) act as oxidizing agents in chemical reactions, which means they remove electrons from the other reactants in the reaction and themselves take those electrons. Thus exposure to these oxidizing agents results in the components of tissues getting converted into other products. For example, the oxidation of sugars and many other organic compounds by sulfuric acid often leaves carbon, carbon dioxide, and/or or other tar-like oxidized organic compounds in its wake.

Sulfuric acid and nitric acid can cause other kinds of reactions as well. For example, the carbon can become sulfonated or sulfated. Nitric acid forms different types of nitrated compounds similar to how sulfuric acid forms sulfonates. These often are brightly colored yellow or orange.

There is one other dangerous way in which acids can harmliving tissue.You see, protons donated by acid catalysts help in carrying out dehydration reactions. These are a type of chemical reaction that involves the loss of a water molecule from the reacting molecule.Reactions between strong acid and water are also highly exothermic, that is, they release a tremendous amount of heat. (This is why students in chemistry labs are advised to never add water to a strong acid, since it is likely to cause the small amount of water initially added to boil, forming a mixture of hot steam and concentrated acid.)So, acids themselves draw out waterin dehydration reactions, and this water then strongly reacts with the acid. So if concentrated sulfuric acid is thrown on living skin, which contains water, thenthat gets dissolved into the acid drying, heating, and burning the tissues exposed.

The severity of the burn is related to a number of factors, including the strength of the acid (that is, how readily it can give off protons during protolysis), the concentration of the acid, how long did the acid stay in contact with the tissue, how much acid was used, etc.

Treating Acid Burns

Some acid burns are made worse if rinsed (flushed) with plain water, simply because, as we just saw, the reaction between a strong acid and water generates a lot of heat.One good solution: use a lot of cold water, so that even when the initial reaction starts producing heat, the large volume of cold water simply washes away all the acid too quickly for that heat to damage the body any further.

However, there are some who feel sulfuric acid on the skin can be flushed with a mild, soapy solution if the burns are not severe. Then again, soap contains alkali, and alkali-acid reactions are also exothermic, and that can harm our skin too. Also, alkalis don't create coagulum but rather start liquefaction necrosis. Like the name sounds, the outer fat layer of cells are broken down in a process called saponification, and the cells themselves liquefy and dissolve, creating pockets of

gooey tissue that allow for the alkalis to seep into deeper structures in the body. So, alkalis can cause more severe damage than acids.

Thus the process of treating acid burns need not always be the same for different kinds of acids.This must be remembered, because treating the burn wrongly can cause further complications.