# Chem1311Ch4Ep3 Transcript

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Hello and welcome to the third episode of reactions in aqueous solutions.

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Previously in reactions to aqueous solutions.

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We learned to recognize precipitation reactions.

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We learned to predict the products of a precipitation reaction and to determine if it will proceed or not.

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And we learned to write ionic and net ionic equations.

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In today's episode.

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We will consider some of the properties of acids and bases.

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We will use two different definitions of acids and bases.

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And we will classify substances as acids, bases or both.

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The next two types of reaction we will be learning about involve acids and bases.

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We will now learn some background information on these types of substances before considering the reactions.

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Acids have a characteristic sour taste.

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Vinegar and lemon juice, or their sourness to their acid content.

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Acids cause color changes in plant dies and for this reason they are part of the tie-dyeing process.

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They react with active metals to produce hydrogen gas.

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Like this.

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They also react with carbonates and bicarbonates to produce carbon dioxide.

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Like this.

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And as you might suspect, their aqueous solutions conduct electricity.

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Bases are also characterized by some common properties.

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They have a bitter taste like soap.

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If you are wondering how I know.

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What soap tastes like?

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My mother had a very strict no cussing.

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And I had a.

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Mouth like a sailor growing up.

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They have a slippery feel.

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They also cause color changes in plant dyes and are also part of the tie-dyeing process.

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And their aqueous solution conduct electricity.

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There are several definitions for acids and bases.

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In this course we will use the Arrhenius and the Bronsted definitions.

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An Arrhenius acid is a substance which produces hydrogen ions in solution.

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The hydrogen ion is also called the hydronium ion.

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But I think that's just pretentious, so I rarely use the name.

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An Arrhenius base is a substance that produces the hydroxide ion in water.

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Ammonia gas fits this definition because it forms ammonium hydroxide when it combines with water.

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The second molecular reaction shows you that.

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The so-called hydronium ion is produced by both organic and inorganic acids.

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Inorganic acids are written as ionic compounds with hydrogen being the cation.

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Organic acids are written as hydrocarbons with a.

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COOH ending to represent the acid.

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The Arrhenius bases will be metal hydroxides and ammonia.

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Carbonates, and bicarbonates do not fit.

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The Arrhenius definition of bases.

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But they do fit the Bronsted definition.

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A Bronsted acid is a proton donor.

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That is a hydrogen iron donor.

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A Bronsted base is a proton acceptor.

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Under the Bronsted definition.

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Water is acting as an acid because it loses a hydrogen ion.

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I'm sorry because it loses a.

00:06:08

Hydrogen ion in this example.

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And ammonia is acting as a base because it accepts a hydrogen ion.

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If you consider the reverse reaction.

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The ammonium ion is acting as an acid.

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Because it's donating a hydrogen ion.

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And the hydroxide is acting as a base.

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Keep in mind that a Bronsted acid must contain at least one ionizable proton or hydrogen ion.

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Only one proton from a water molecule is ionizable, by the way, a hydroxide ion could not donate its one hydrogen.

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Even though ammonia does not have a negative charge, Bronsted bases typically have at least one negative charge.

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A couple of quick definitions.

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Monoprotic acids contain only one hydrogen ion or proton.

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Hydrochloric acid

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Nitric acid

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And acetic acid are all examples of monoprotic acids.

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Diprotic acids have two hydrogen ions or protons.

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Sulfuric acid is an example of a diprotic acid.

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At this point I would like to point out that even though sulfuric acid is considered a strong acid.

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The second proton or hydrogen ion is not strong, only the first is.

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I know, I held back info. before, I'm sorry.

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Triprotic acids have three hydrogen ions or protons.

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Phosphoric acid is an example of a triprotic acid.

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Something to notice.

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All weak acids are shown with double arrows in their in their dissociation equation.

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Strong acids are shown with only the single arrow.

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This table shows some acids including six of the strong acids.

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Quiz time.

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Which of the seven strong acids is missing?

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Did you say chloric acid?

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Because chloric acid is the correct answer.

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Yay for you!

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There are three examples of substances.

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Classify each one of these substances as a Bronsted acid.

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Or a base.

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Pause the video.

00:10:08

Write down your answer and then come right back.

00:10:22

Welcome back.

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Remember that to determine whether something is a Bronsted acid, it must contain at least one hydrogen atom.

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And remember that Bronsted bases are going to be ammonia or anions.

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So back to the examples.

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We see that the first example is a Bronsted acid.

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And the second example is a Bronsted base because Bronsted acids donate protons and Bronsted bases accept them.

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The third example can react as either an acid or a base.

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This is actually not uncommon.

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Substances that can behave as an acid or as a base are called amphoteric substances.

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And that's all there is.

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There isn't anymore.