Chem1311Ch4Ep1 Transcript

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

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In this series.

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We will learn the difference between a strong electrolyte, a weak electrolyte and a nonelectrolyte.

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We will learn the difference between strong and weak acids, and which is which.

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We will learn to recognize eight different types of reaction and how to predict the products.

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Of the reaction.

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And we will learn to assign oxidation numbers and to determine which reactant is the oxidizing agent.

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And which is the reducing agent?

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A solution is defined as a homogeneous mixture of two or more substances.

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It may be a solid, a liquid or a gas.

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The solute.

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The solute is the substance present in the smaller amount in the solution.

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And the solvent is the substance present in the larger amount in the solution.

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Here we have a few examples of solutions.

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The solvent in a soft drink is water.

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With sugar, carbon dioxide caramel.

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Artificial color and many other ingredients being the solute.

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Air is a solution in which nitrogen is the solvent.

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And oxygen, methane, carbon dioxide, water and many other gases are solutes.

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Soft Solder is a solution.

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Of lead.

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And tin is the solute.

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In this series we will look at chemical reactions that take place in aqueous solutions.

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An aqueous solution is a solution in which water is the solvent.

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An electrolyte is a substance that, when dissolved in water, conducts electricity.

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A nonelectrolyte, as you might suspect, is a.

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A substance that, when dissolved in water, does not conduct electricity.

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As you can see in this image, weak.

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Electrolytes conduct electricity, just not as well as strong electrolytes do.

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So the question arises, why do electrolytes conduct electricity at all?

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That is the right question.

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You may remember that ionic compounds, including acids, are made up of an anion and a cation which are charged due to an electron transfer that has taken place between them.

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When a strong electrolyte dissolves in water.

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All cations and anions separate.

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And they are able to move away from each other.

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The presence of these individually charged particles.

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It's what allows the solution to conduct electricity.

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Weak electrolytes do not conduct electricity as well because not all the cations and anions separate from each other, some remain together.

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Acetic acid is an example of a weak electrolyte.

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Both of these electrolytes have a cation and an anion.

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So they both conduct electricity.

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The difference is

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That the process of separating 2 ions is reversible.

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For weak electrolytes.

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It is similar to cleaning your home.

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While a trio of overactive boys run amok and make a mess.

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The cleaning will simply never be done.

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The double arrows indicate that the reaction proceeds in both directions.

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And this is the case for every one of the weak electrolytes.

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Perhaps you are curious about the reason why electrolytes separate from each other even though they are attracted to each other, being that they have opposite charges.

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The answer is in this diagram.

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Water is the solvent.

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So being the majority compound, water molecules are all around the solute.

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Notice also that the oxygen atom of those water molecules that are surrounding the cation are turned towards the cation.

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They are attracted to it because the oxygen in water is slightly negative.

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Around the anion, on the other hand, hydrogen atoms turn to face it because they are slightly positive.

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The attraction to the water molecule pulls the ions away from each other.

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The reason why non-electrolytes do not conduct electricity.

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Is that they are molecular, and not ionic in nature.

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So they don't produce ions in solution.

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If you must decide which of these three categories a compound belongs to.

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It's just a matter of knowing a couple of guidelines.

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Non-electrolytes will always be molecular compounds.

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Weak electrolytes will be either weak acids or ammonia.

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And strong electrolytes will be ionic compounds.

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And strong acids.

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I realize this is the first time you hear about strong and weak acids.

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You know what an acid is, but you never knew they worked out.

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Just kidding.

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You will need to be able to tell strong acids from weak acids.

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However, this is actually simpler than it seems.

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There are only seven strong assets.

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If it's not on the list, I'm about to give you.

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It's a weak acid.

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The first three.

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Strong acids are industrial acids.

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You have probably heard of hydrochloric acid, sulfuric acid, and nitric acid.

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They have a wide number of uses in industry.

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The next three are from the halogen group.

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Hydrochloric, hydrobromic and hydroiodic

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And the last three are chlorine containing acids.

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Hydrochloric, chloric and perchloric acid.

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I know I promised only seven, but hydrochloric acid is my favorite, so I had to give it props.

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All other acids not in this list.

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Are weak acids.

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This is a bit of a spoiler, but very important information for you to know.

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If you are given an equation, you should be able to classify it into one of these eight types.

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I would write them down.

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If you are given only the reactants for any of the reaction types highlighted right now in blue.

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You must be able to predict the products and whether it will take place or not.

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For each of the redox reactions highlighted in blue now.

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You should be able to assign oxidation States and determine the identities of the oxidizing agent and the reducing agent.

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That, in a nutshell, is what we're doing for this series.

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And that's all there is.

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There isn't any more.