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Hello and welcome to the second episode of Chemistry,

the study of change.

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Previously in chemistry the study of change...

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We differentiated between observation and hypothesis.

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And also between laws and theories.

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We classified matter according to its composition.

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We learned the definitions of several terms associated with matter.

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In today's episode...

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We will differentiate between physical and chemical changes.

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Between physical and chemical properties.

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Between intensive and extensive properties.

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And finally, between mass and weight.

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And also why we don't care that they're different.

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The purpose of this image is not to show the different states in which matter can be found.

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That would be silly.

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The point is to point out that whether a substance is a solid, a liquid, or a gas.

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There is no change to the particles that make it up.

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And therefore.

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All phase changes are physical changes.

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As no bonds are broken.

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Or formed in this process.

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This is also true for compounds such as water.

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Note that the bonds between the oxygen and the two hydrogen atoms in the water molecule are completely unaffected by phase changes.

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Whether it's a gas, a liquid, or a solid, notice that two hydrogen atoms are clustered together with every oxygen atom.

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We will now consider the different types of changes that matter can undergo.

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A physical change does not affect the composition of the substance.

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No chemical bonds are broken in the process.

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Examples of physical changes include the formation of mixtures.

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phase changes.

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And crushing, cutting or deforming.

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Chemical changes do affect the composition.

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And the identity of the substance.

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And they result from the breaking and or forming of chemical bonds.

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When we speak of properties.

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We are referring to either the substance's ability to undergo chemical change.

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Or the observable qualities of the substance.

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Chemical properties fit the first definition.

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These will include terms that imply the potential or the lack of potential to react [chemically].

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Flammable, stable.

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Or explosive.

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Corrosive and caustic are all examples of terms that imply a chemical property.

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Physical properties are those observable qualities that do not result in chemical change.

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Such as color, malleability.

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Brittleness, hardness and such.

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More on physical properties:

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Physical properties can be extensive or intensive.

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Extensive properties are those that are affected by the sample size.

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Such as the mass,

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The length,

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And the volume.

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Intensive properties on the other hand, are unaffected by the sample size.

Density, temperature,

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And color are all examples of intensive properties.

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Earlier we describe matter as anything having volume and mass.

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But we did not define mass.

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My bad.

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Well, mass is the amount of matter in a sample or object.

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And the unit to measure it is the kilogram.

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Weight, on the other hand, is the force that gravity exerts on an object.

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The weight of an object does depend on its mass, but they are not the same.

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Let's illustrate a difference between them.

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The weight of an object.

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Will vary slightly if the object moves over the surface of the earth.

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It will be at a maximum.

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At the poles.

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And it will be at a minimum.

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At the equator.

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But the mass remains exactly the same.

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A more extreme example is what happens to an object's weight.

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On the surface of the moon.

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Since most chemists are too poor to carry out experiments on the moon.

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We often slip into the common use of.

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A treating weight and mass as if they were synonymous.

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Even though they're not.

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Just don't tell the physicists 'cause they'll have a cow.

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And that's all there is.

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There isn't anymore.