



# **PHYSICAL & CHEMICAL PROPERTIES OF MATTER**

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# Physical Properties

A property that can be observed or measured without changing the identity of the matter.

These are often used to identify and classify matter.



# Examples of Physical Properties

- Odor
- Volume
- Color
- Texture
- Hardness
- Flexibility
- Shine
- Temperature



## Thermal Conductivity

The ability to transfer thermal energy from one area to another.

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Example: Plastic foam is a poor conductor of heat, so hot chocolate in this type of cup will not burn your hand.

# State

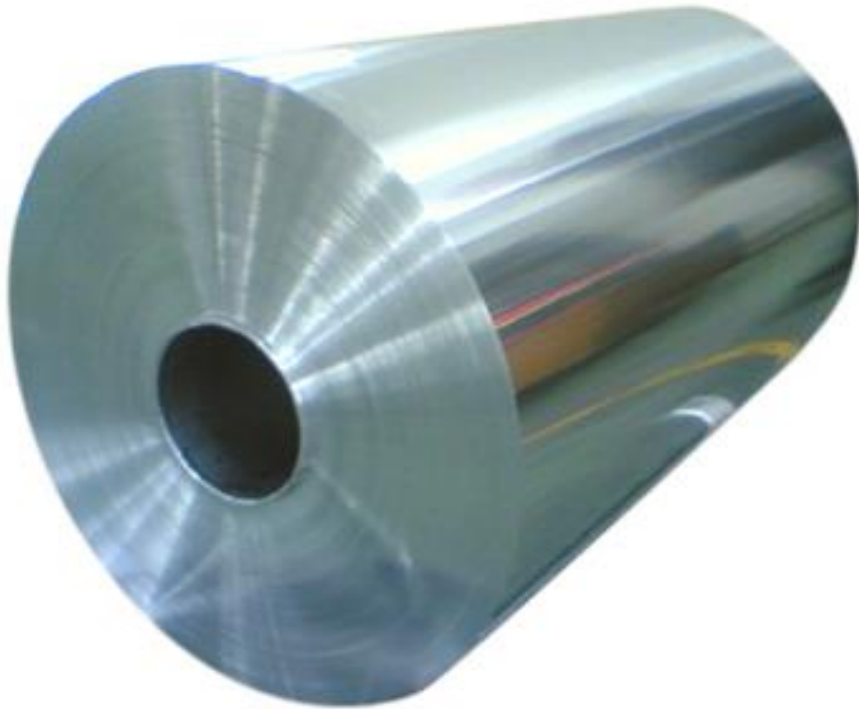


The physical form in which a substance exists, such as a solid, liquid, or gas.

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Example: Water can take on a state of a solid (ice), liquid, or gas (vapor)

# Malleability



The ability to be pounded into thin sheets

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Example: Aluminum can be rolled and pounded into sheets to make foil, cans, and other products.

# Ductility

The ability to be drawn or pulled into a wire

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Example: Copper is often used to make wire.



# Solubility



The ability to dissolve  
in another substance

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Example: Sugar  
dissolves in water



# Density



The amount of matter occupying a given volume

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Example: Lead is used to make sinkers for fishing line because lead is more dense than water

# Review

1. What are three physical properties of water?
2. Why does a golf ball feel heavier than a ping-pong ball?
3. How can you determine the relative densities of liquids?
4. How could you determine a coin is made of pure silver?

# Chemical Properties



A property of matter that describes a substance based on its ability to change into a NEW substance with different properties. These properties are not as easy to observe as physical properties.

# Flammability



The ability to burn

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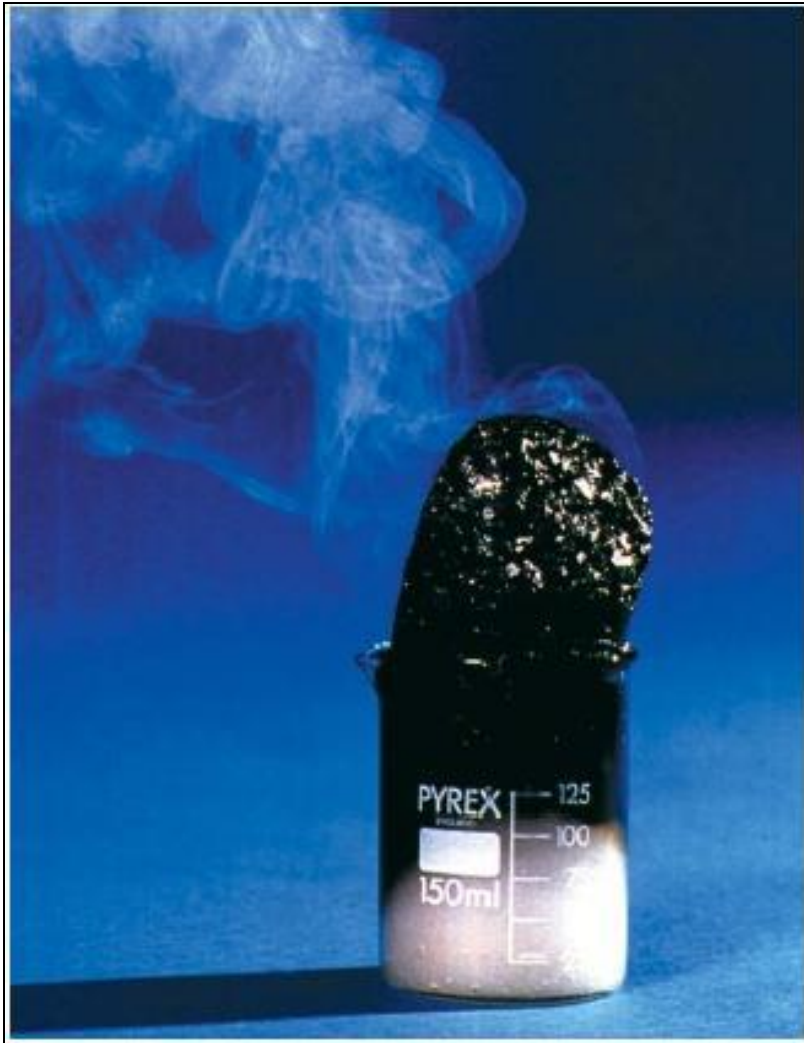
Example: Burning a piece of wood creates new substances like ash and smoke. These substances have different properties.

# Reactivity

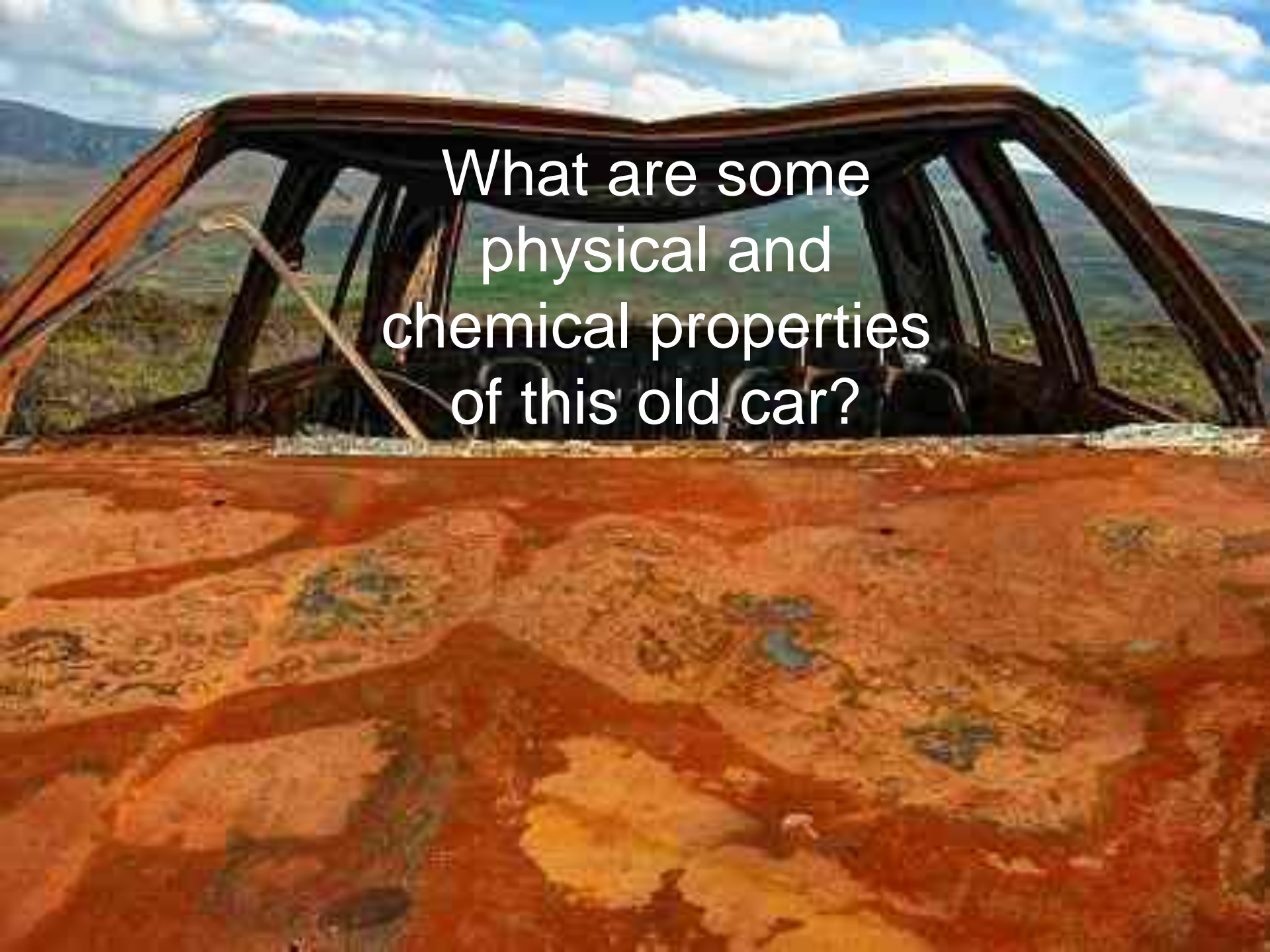
Two substances get together and something happens

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- Reactivity with oxygen
- Reactivity with acid
- Reactivity with water



Reaction of Sulfuric Acid and Sugar

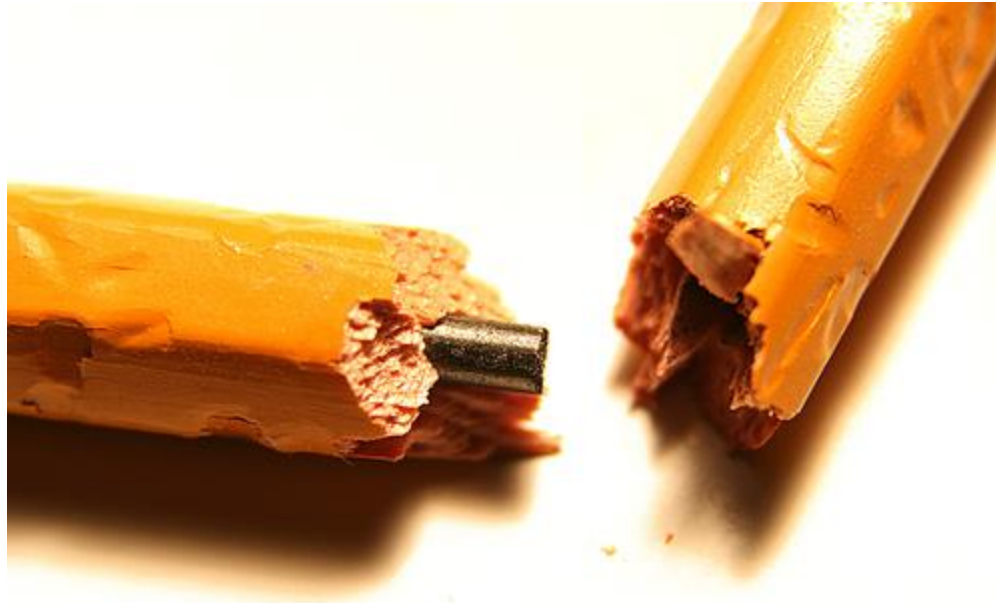
A photograph of a rusted, skeletal car frame in a desert landscape. The car is the central focus, showing its dark, charred metal structure against a backdrop of a blue sky with white clouds and distant mountains. The foreground is a vast, flat, reddish-brown desert floor with some sparse, low-lying vegetation. The text is overlaid in the center of the image.

What are some  
physical and  
chemical properties  
of this old car?

# Comparing Physical and Chemical Properties

<u>Substance</u>	<u>Physical Property</u>	<u>Chemical Property</u>
Iron	Malleable	Reacts w/oxygen
Wood	Grainy texture	Flammable
Rubbing Alcohol	Clear Liquid	Flammable
Helium	Less dense than air	Nonflammable
Baking Soda	White Powder	Reacts w/vinegar

# Physical Change



A change that affects one or more physical properties

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Example: Breaking a pencil or a piece of chalk.



# Physical Change Examples

Freezing water



Melting butter



Mixing oil & vinegar



Dissolving sugar



Bending metal

Cutting hair

**Can most of these changes be undone?**

# Chemical Change

A change that occurs when one or more substances are changed into entirely new substances with different properties. Clues include production of sound, light, color, or odor and/or fizzing, foaming, or creation of heat.



Example: Baking a cake

# Chemical Change Examples

Soured milk



Effervescent tablets

Hot gases



Rusting metal



**Can most of these changes be undone?**

# Review

1. Classify each of the following properties as either physical or chemical: reacts with water, breaks down a seam, is blue, fizzes when combined with vinegar.
2. What are three clues that indicate a chemical change might be taking place?