Mixtures

Physical Science | Lesson Guide

Kindergarten

Photo Description

This image shows a cooking activity where dry ingredients (brown flour or cinnamon mixture) are being combined with a wet red ingredient (likely tomato sauce or food coloring) using a KitchenAid mixer. The photograph captures the moment before wet and dry materials are mixed together, displaying clear observable differences in color, texture, and state of the materials on a wooden countertop.

Scientific Phenomena

Anchoring Phenomenon: Combining different materials to make something new

When we put two or more different materials together, they can combine to form a mixture. In this image, dry powdery material and wet sauce are about to be mixed. The scientific reason this happens is that when materials combine physically (without changing into completely different substances), the tiny bits of each material spread throughout the other. The mixer will help break apart clumps and distribute the materials evenly, creating a uniform mixture. This is an observable physical change—we can still identify the original materials, but they now exist together in a new combination.

Core Science Concepts

* Physical Properties: Materials have observable characteristics like color, texture (bumpy, smooth, powdery), and state (dry vs. wet) that we can see and feel before and after mixing.

* Mixtures: When two or more materials combine together, they form a mixture. A mixture can sometimes be separated back into its original materials.

* Change Through Mixing: Stirring, whisking, or using a machine causes materials to move and combine, creating visible changes in how the mixture looks and feels.

* Cause and Effect: The action of the mixer (cause) produces movement and combination of materials (effect), changing the appearance of both ingredients.

Pedagogical Tip:

Use real kitchen materials for this lesson because Kindergarteners are concrete learners who connect best to familiar, everyday objects. Cooking demonstrations activate prior knowledge from home experiences and make abstract concepts like "mixing" tangible and personally meaningful. Always allow students to watch the process unfold rather than showing only the final result.

UDL Suggestions:

Provide multiple means of engagement by allowing students to observe the mixing process at different distances—some children may have visual processing differences and benefit from being closer to the action. Offer tactile exploration by letting students (with clean hands) feel the dry ingredient before mixing, then feel the texture after combining. Use a slow-motion video or photograph sequence to support students who process information more slowly or who benefit from visual scaffolding of the sequential steps.

Zoom In / Zoom Out

Zoom In: The Microscopic View
If we could shrink down really, really small—smaller than a speck of dust—we would see that the brown powder is made of millions of tiny grains, and the red sauce is made of water with tiny red bits floating in it. When the mixer spins, it pushes these tiny grains and drops of sauce around and around. The tiny grains of brown powder get pushed into the spaces between the red liquid, and the red liquid spreads over the brown grains. At this super-small level, we can still see the two different materials—the brown grains and the red liquid—but now they're all mixed together instead of separated. This is why a mixture is different from a brand-new material: if we looked very closely with a special microscope, we could still find both original materials inside.

Zoom Out: Cooking in a Kitchen System
When we zoom out and look at the bigger picture, this mixing activity is part of a whole kitchen system. The cook uses many different tools (the mixer, bowls, measuring cups, the wooden counter) and ingredients from different places (the flour from the grocery store, the tomato sauce from a can or garden). All these materials come together in one kitchen to make food that a family will eat. The mixer uses electricity from the house's power system. After mixing, the food might go into an oven that also uses energy. Finally, the finished food becomes part of meals that nourish people's bodies. This one mixing moment is connected to farming, transportation, electricity, nutrition, and family traditions—all part of a much larger system!

Discussion Questions

1. What do you see happening in the bowl right now? What will happen next? (Bloom's: Remember | DOK: 1)

2. Why do you think the cook is using the mixer instead of just stirring by hand? What's the difference? (Bloom's: Analyze | DOK: 2)

3. If we stopped mixing right now, do you think we could separate the red and brown materials back into two piles again? Why or why not? (Bloom's: Evaluate | DOK: 3)

4. What other things at home or at school do we mix together? What happens when we mix them? (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

Misconception 1: "Mixing makes the materials disappear."
Some Kindergarteners may think that when two materials mix together, one or both of the original materials vanish or turn into something completely new and different. Scientific Clarification: When we mix materials, they don't disappear—they're just spread throughout each other. If we looked very carefully, we could still find the brown powder and the red sauce mixed together. They've changed how they look together, but both materials are still there. A mixture is different from magic—we can still find the original materials inside if we try hard enough.

Misconception 2: "Once things are mixed, they can never be separated."
Kindergarteners may believe that mixing is permanent and irreversible for all mixtures. Scientific Clarification: Some mixtures CAN be separated, and some are very hard to separate. For example, if we mixed sand and water, the sand would sink to the bottom and we could pour off the water—separating them! But if we mixed flour into water to make dough, it's much harder to separate them back. Different mixtures behave differently, and that's part of what makes mixing interesting.

Misconception 3: "The mixer is doing magic to change the materials."

Young students may not understand the cause-and-effect relationship between the mixer's spinning action and the combining of ingredients. Scientific Clarification: The mixer isn't magic—it's a tool that helps us mix faster! The spinning blades push the materials around and around very quickly. When materials get pushed and moved a lot, they mix together much faster than if we stirred by hand. The mixer is just a helper that does the same job as stirring, but it does it much quicker and more evenly.

Extension Activities

1. Sensory Mixing Station: Set up three stations with safe, edible materials: dry materials (rice, flour, crushed cereal), wet materials (water, food coloring, yogurt), and tools (spoons, funnels, small cups). Allow students to freely explore mixing different combinations in shallow containers while wearing aprons. Ask them to describe what they see, feel, and predict before and after mixing. This hands-on exploration builds vocabulary and observation skills.

2. Color Mixing Prediction: Place blue and yellow water in clear cups. Before combining them, ask students to predict what color will result from the mixture. Slowly pour one into the other while students watch the green mixture form. Repeat with other color combinations (red + white = pink, etc.). Students can record predictions with drawings before each combination and compare to actual results.

3. "Unmixing" Investigation: Create a simple mixture of sand and water in a clear container and let it settle. Show students that some mixtures can separate naturally over time (sand sinks, water remains on top). Compare this to the wet-and-dry cooking mixture, discussing which combinations are easier or harder to separate. Use a strainer or filter to demonstrate another way to separate some mixtures.

Cross-Curricular Ideas

Math Connection: Measuring and Patterns
Use this mixing activity to introduce measurement concepts. Have students help measure dry ingredients using measuring cups and spoons, discussing "more" and "less." Count the number of times the mixer spins or beeps. Create a simple pictograph showing "ingredients we mixed today" by drawing pictures of the sugar, flour, and sauce. Discuss patterns: "We mixed one cup of brown ingredient and one cup of red ingredient—they match!"

ELA Connection: Recipe Stories and Sequencing
Create a class recipe book with pictures showing the steps: "First we measure. Then we mix. Next we blend. Finally we have a mixture!" Have students dictate or draw sentences about what they observe. Read recipe-based picture books like Pancakes, Pancakes! by Eric Carle and discuss the order of steps. Students can use sequencing words (first, next, then, last) to describe the mixing process, building early literacy skills.

Art Connection: Color Mixing and Texture Exploration
Extend the red-and-brown color mixing into an art exploration. Provide red and brown paint and let students mix colors on paper to create new shades. Discuss how the colors change. Create texture collages by combining different materials (tissue paper, sand, fabric scraps) to represent "mixtures" in art form. Encourage students to paint or draw pictures of their favorite mixing activities and what they created.

Social Studies Connection: Cooking and Cultural Traditions

Connect mixing and cooking to family and community. Ask students: "What do people in your family like to cook and mix together?" Discuss how different families and cultures make different foods by mixing different ingredients. Invite a family member or community helper (chef, baker, nutritionist) to visit and demonstrate mixing a simple recipe. Create a classroom "Recipe Chart" where families contribute pictures or descriptions of dishes they make at home, celebrating the diversity of mixing traditions.

STEM Career Connection

Chef or Cook
A chef is someone who mixes lots of different ingredients together to make delicious food that people eat! Chefs use tools like mixers, spoons, and pans to combine ingredients in just the right way. They learn recipes and experiment with mixing new combinations to create yummy dishes. Some chefs work in restaurants, some cook for schools or hospitals, and some teach people how to cook at home. Chefs have to be creative, careful measurers, and good observers of how ingredients change when mixed together.
Average Annual Salary: $35,000–$55,000 USD

Food Scientist
A food scientist is a person who studies how different ingredients mix and change when we cook them. They ask questions like "What happens when we heat this mixture?" or "How long does this mixture stay fresh?" Food scientists work in laboratories and test new recipes to make sure foods are safe, healthy, and taste good. They help create foods in factories and figure out the best ways to mix ingredients to keep food fresh longer. Some food scientists work for big companies that make snacks, drinks, or frozen meals!
Average Annual Salary: $65,000–$85,000 USD

Chemist
A chemist is a scientist who studies what things are made of and what happens when different materials mix together. Chemists ask: "What will happen if I mix these two things?" or "How do the tiny pieces behave?" While not all chemists work with food, many do! They study how flavors mix, how ingredients react to heat, and how to create new materials. Chemists use special tools and do careful experiments in laboratories. Some chemists even help invent new foods or medicines!
Average Annual Salary: $75,000–$100,000 USD

NGSS Connections

Grade K Performance Expectation:
K-PS1-1: Plan and conduct investigations to provide evidence that objects can be taken apart and put together, and that some objects may be taken apart and put back together and some cannot.

Disciplinary Core Ideas:
K-PS1.A Structure and Properties of Matter* – Different objects are made from different materials and can be described by the properties of their materials.

K-ETS1.A Defining Engineering Problems* – Asking questions, making observations, and gathering information about a situation people want to change can help define a simple problem that can be solved.

Crosscutting Concepts:
* Cause and Effect – Simple cause-and-effect relationships exist in everyday situations (mixing causes a change in appearance).

* Patterns – Patterns in properties help identify and classify materials; students can observe patterns in what happens when materials combine.

Science Vocabulary

* Mixture: When two or more different materials are put together and mixed so they combine.

* Ingredients: Different materials or things that go into making something (like in a recipe).

* Texture: How something feels when you touch it—bumpy, smooth, rough, or powdery.

* Combine: To put two or more things together.

* Physical Change: When something looks different on the outside, but is still made of the same materials (like mixing).

External Resources

Children's Books:
Mixing Colors* by Kathy Kranking (National Geographic Little Kids) – A photographic exploration of what happens when colors combine.
The Mix-Up* by Emma Carlson Berne – A story about mixing ingredients and unexpected surprises in cooking.
Playtime for Kitty* by Hollie Hibbert – Includes simple mixing and cooking scenarios young children recognize.

Teacher Notes: This lesson connects to Kindergarten students' natural curiosity about cooking, eating, and daily routines. The concrete, observable nature of mixing makes it ideal for this age group. Consider pairing this with an actual simple cooking activity (no-bake cookies, playdough, or edible slime) to deepen understanding through direct experience.