

Kitchen Science

with

Ryan's®



Teacher's Guide

Target Audience

Elementary school students in grades 3-5 and their parents

Program Objectives

- Raise awareness that science impacts everyday life - including food preparation
- Explore chemistry concepts, including emulsions, leaveners, acids, and bases
- Engage students in scientific inquiry through a variety of simple experiments
- Engage parents in student learning at home

Program Components

- This one-page teacher's guide
- Three reproducible activity sheets
- A colorful classroom poster
- A reply card (or go online to www.ymiclassroom.com/ovation) for your comments

How To Use This Program

Photocopy the teacher's guide and activity sheets. Display and refer to the poster throughout the program. Allow students time to discuss the Science Facts and make experiment predictions, then have them take their activity sheets home to share with parents.

Standards: To review how these activities align with Next Generation Science Standards and National Standards for Science, visit www.ymiclassroom.com/ovation.

Materials: Each experiment requires paper towels to cover the work space, plus:

- **Activity 1** — small glass mixing bowl, measuring cup and spoons, fork, vegetable oil, white vinegar, timer
- **Activity 2** — glass jar, 1 egg (uncooked), white vinegar, large spoon
- **Activity 3** — 3 glass cups, measuring spoons, water, white vinegar, baking soda, baking powder

Activity
1

Overcome by Emulsion

Part A. Answers: vinaigrette – B, D; mayonnaise – B, C, D; milk chocolate – A, E.

Part B. Have students take turns helping to conduct the experiment, documenting their findings on a sheet of paper. Explain that the emulsion is unstable because the molecules separate into their two components over time. Molecules need an emulsifier to create a stable emulsion in food, such as mustard or egg yolks.

Encourage students to try the vinaigrette recipe at home, explaining the role of mustard as an emulsifier for stability. Have students share their recipe experiences in class.

Activity
2

Eggs-traordinary

Part A. Answers: boiled, scrambled, fried, baked, poached. Assemble student recipes as an *Eggs-cellent Family Buffet* cookbook for display.

Part B. Have student volunteers help prepare and record the results of the experiment on both sides of the sheet (if needed). (Note: If possible, place the jar in the refrigerator overnight.) Scoop the egg out of the vinegar after 24 hours (or more, should the eggshell not dissolve by then). Pour the vinegar out and place the shell-less egg back into the glass jar for students to observe.

Explain that a chemical reaction occurs as the solid calcium carbonate crystals that make up the eggshell are slowly broken apart by the acid in the vinegar. The calcium is dissolved into the vinegar while the carbon forms carbon dioxide as evidenced by bubbles observed around the eggshell while the egg was in the jar with the vinegar. The vinegar does not react with the egg's membrane, which is still intact!

Dear Educator,

Cook up some back-to-school excitement for your students with this **free Kitchen Science educational program** brought to you by curriculum specialists Young Minds Inspired (YMI) and Ryan's buffet family restaurant.

Designed to help students understand that **science is part of everyday life** and not confined to a laboratory, *Kitchen Science* introduces standards-based student exploration of basic principles in **chemistry**. Each activity features an **in-class** experiment and a **take-home** component to include parents in the learning fun.

We hope that you will **share** this program with other teachers in your school. Although the materials are copyrighted, you may **make as many copies as needed** for educational purposes. Please use the enclosed **reply card** or comment online at www.ymiclassroom.com/ovation to provide feedback. We depend on your input to continue providing free educational programs that make a real difference in students' lives.

Sincerely,

Dr. Dominic Kinsley
Editor in Chief
Young Minds Inspired



is the only company developing innovative, free classroom materials that is owned and directed by award-winning former teachers. Visit our website at www.ymiclassroom.com to send feedback and download more free programs. For questions, contact us toll-free at 1-800-859-8005 or by email at feedback@ymiclassroom.com.



Activity
3

Rising to New Heights

Part A. Answer: pancakes

Part B. Review the directions with students and have them make predictions. Help them take turns completing the experiment and documenting the results. Students will observe the following:

- **Baking powder + water** = a fizzy reaction, because baking powder is an acid.
- **Baking soda + water** = no reaction, because baking soda is a base.
- **Baking soda + vinegar** = a strong fizzy reaction, because an acid combines with a base.

Review student predictions and explain that baking powder is acidic and requires adding a liquid (in this case, water) to create a fizzy reaction. Baking soda is a base and any bubbles noted when adding water to it are short-lived and the result of air displacement. As a base, baking soda requires the addition of vinegar (an acid) to create a reaction and, because vinegar has a high Ph (or degree of acidity), the reaction is more dramatic. (You may elect to have students add vinegar to baking powder to compare the force of its reaction.)

Resources www.ymiclassroom.com/ovation

Emulsions <http://kitchenscience.sci-toys.com/Emulsions>
<http://culinaryarts.about.com/od/glossary/g/Emulsion.htm>

Eggs www.exploratorium.edu/cooking/eggs/index.html
www.science-sparks.com/2012/12/24/how-to-get-an-egg-yolk-without-cracking-the-egg/

Chemical Leaveners <http://indianapublicmedia.org/amomentofscience/baking-with-carbon-dioxide/>

Activity

1

Reproducible
Master

Overcome by Emulsion

Did you know that preparing food is really a science? Test your knowledge of kitchen science with these experiments.

Kitchen Science Facts

- An **emulsion** is a **mixture** of a **fat** and a **liquid** that would not usually be combined, like oil and vinegar.
- **Stable emulsions never separate.** Unstable emulsions revert back to the original ingredients over time.
- **Stable emulsions** include an **emulsifier**, which is a substance that **allows molecules to interact** and bind together as they mix. In cooking, emulsifiers include **eggs** and even **mustard!**



Part A.

Kitchen Science Challenge!

Write the letter of the **ingredients** at right next to the **emulsions** they help create. (Hint: Some ingredients may be used in more than one emulsion.)

INGREDIENTS

- A. Milk**
- B. Oil** (olive, vegetable, canola, etc.)
- C. Egg yolks**
- D. Vinegar or lemon juice**
- E. Cocoa butter**



EMULSIONS

- Vinaigrette** 1. ___ 2. ___
- Mayonnaise** 1. ___ 2. ___ 3. ___
- Milk chocolate** 1. ___ 2. ___

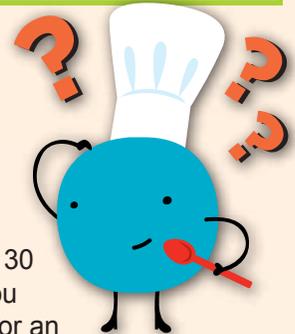


Part B.

What would happen if...

...you experimented with an emulsion? Follow the steps below and your teacher's directions to see if you can mix up some results!

1. Measure 3 tablespoons of **white vinegar** in a **glass bowl**.
2. Measure ½ cup **vegetable oil** into a measuring cup.
3. Add the **vegetable oil** into the **vinegar** in the glass bowl **2-3 tablespoons at a time**.
4. Use a **fork** to beat the mixture **after each addition** of oil.
5. **Observe the emulsion** after 30 minutes. Did you make a **stable** or an **unstable** emulsion? How can you tell?



Kitchen Science at Home

Restaurant chefs use **emulsions** like the recipe for vinaigrette dressing below to make their fresh salads taste great. Ask a parent to help you make it at home and toss it together with your favorite salad ingredients!

Salad Vinaigrette Recipe

INGREDIENTS

- 3 tablespoons white wine vinegar
- ½ cup olive oil
- 1 teaspoon Dijon mustard
- Salt and pepper to taste



DIRECTIONS

In a small bowl, whisk together the vinegar, mustard, and salt and pepper. Slowly add the olive oil, whisking as you add.

PERSONALIZE IT!

Add your favorite fresh herbs or flavorings (cilantro, oregano, fresh garlic, bacon bits, finely grated parmesan, etc.) as a finishing touch.



At Ryan's, science and food are always on the menu! Our talented chefs make dishes that will satisfy the **cravings** of everyone in your family. We also throw in a dash of family fun with special events like our **Kids' Birthday Club** and **Thursday Family Night** where, each week, a different family activity is included as part of the dining experience!



Activity
2

Reproducible
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Eggs-traordinary

Eggs are amazingly versatile as well as tasty! Did you also know that you can do a “magic” disappearing trick with one? Read on...

Kitchen Science Facts

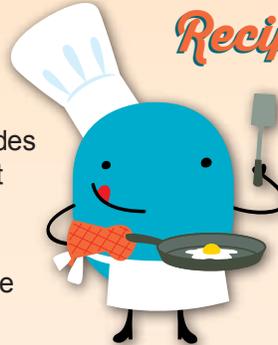


Inside the shell, **eggs** contain two main parts, the **white** and the **yolk**. The white is mostly made of **water** and **albumen**, a special **protein**. The **yolk** is mostly made of **fat**, but also includes some **protein** along with **lecithin**. **Lecithin** is a substance that helps **bind molecules together** to create an **emulsion**.



The **eggshell** is made of **calcium carbonate**, a compound made of the elements **calcium** and **carbon**. Calcium carbonate makes the eggshell **hard**.

Recipe Fun



Ask a parent to help you find a recipe for your favorite dish that includes eggs as an ingredient. Write the recipe on a separate piece of paper and bring it to school for a class collection of recipes!

Part A.

Kitchen Science Challenge!

Unscramble the letters at right to identify ways in which **eggs** may be prepared for eating. As proof of more science at work, each of these preparations uses **heat** to create a **chemical reaction** that changes the physical properties of the egg!

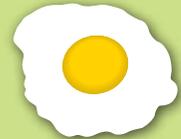
DELIQB: _____ **D**

BMARSCEDL: _____ **C** _____ **D**

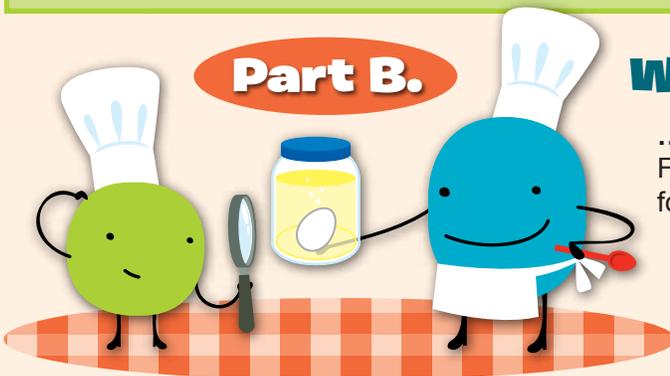
IDERF: _____ **R** _____

KAEDB: _____ **K** _____

PAOEDCH: _____ **O** _____ **C** _____



Part B.



What would happen if...

...you could make an eggshell disappear?
Follow the steps below and your teacher’s directions for some eggs-cellent results!

1. Gently place an **uncooked egg** into a **glass jar**.
2. Cover the egg with **white vinegar** for at least 24 hours.

Eggshell Observations

Kitchen Science *at Home*

Do you know how to tell a **raw egg** from a **cooked one**? Ask a parent to hard-boil an egg and then **spin** both of them on a table. The hard-boiled egg should spin easily on its end; the raw egg, not so easily!



Ryan's

Ryan's cooks up lots of **eggs** every day! That's because eggs are tasty and used in so many different menu dishes like **omelets**, **cakes**, and **breads**. They're also used in **sauces**, **coatings** and **glazes**. Visit one of our restaurants near you to sample some **eggs-ceptionally tasty menu items!**

YMI
YOUNG MINDS INSPIRED

Activity
3
Reproducible
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Rising to New Heights

Sometimes, playing with your food can make for interesting results. Try these experiments and you'll think differently the next time you enjoy a yummy favorite.

Kitchen Science Facts

- Baking powder is an acid. Baking soda is a base. In chemistry, acids and bases have different properties that cause chemical reactions.
- Baking powder and baking soda are both chemical leaveners. A chemical leavener is a substance that creates a reaction when moistened and heated.
- In baking, acids and bases react to form and release carbon dioxide (CO²) bubbles in the dough. This reaction causes dough to rise and to create a food product with a light and fluffy texture.

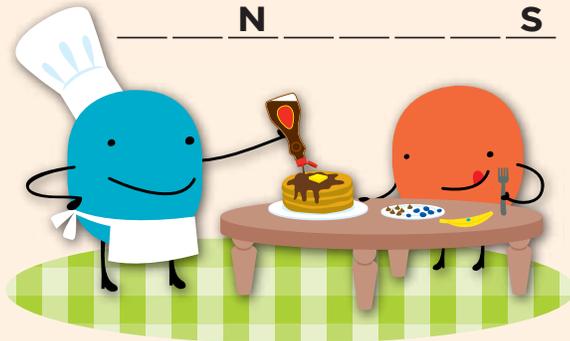


Part A.

Kitchen Science Challenge!

Write the name of a favorite breakfast food that uses baking powder or baking soda as a leavener to make them light and fluffy!

_____ N _____ S



Part B.

What would happen if...

...you created reactions with baking powder and with baking soda? Follow the steps below and your teacher's directions for some interesting results.

1. Place a tablespoon of baking powder into a glass cup. Add water and observe.

My prediction: _____

2. Place a tablespoon of baking soda into a different glass cup. Add water and observe.

My prediction: _____

3. Place a tablespoon of baking soda into a third glass cup. Add vinegar instead of water and observe.

My prediction: _____

Kitchen Science at Home

Mix up a chemical reaction at home by asking a parent to help you make some pancakes! Then get creative and choose toppings and add-ins to pack more flavor into your pancakes! These can include: chocolate chips, blueberries, sliced bananas, nuts, coconut, whipped cream, strawberries, and chocolate sauce.

Who doesn't love pancakes? Come in for an amazing breakfast spread every Saturday and Sunday at Ryan's and enjoy all your favorites. We have bacon, sausage, pastries and, of course, plenty of pancakes!



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Bring in this coupon to receive
One FREE Kids Meal
with purchase of one adult meal.



Menu varies by day, time, and location. Valid at participating locations only. Not valid with seniors discounts or other offers. Kids must be 11 or under. Limit 2 kids per paying adult. Dine-in, single use only. No cash value. Reproduction prohibited. Not valid on holidays.

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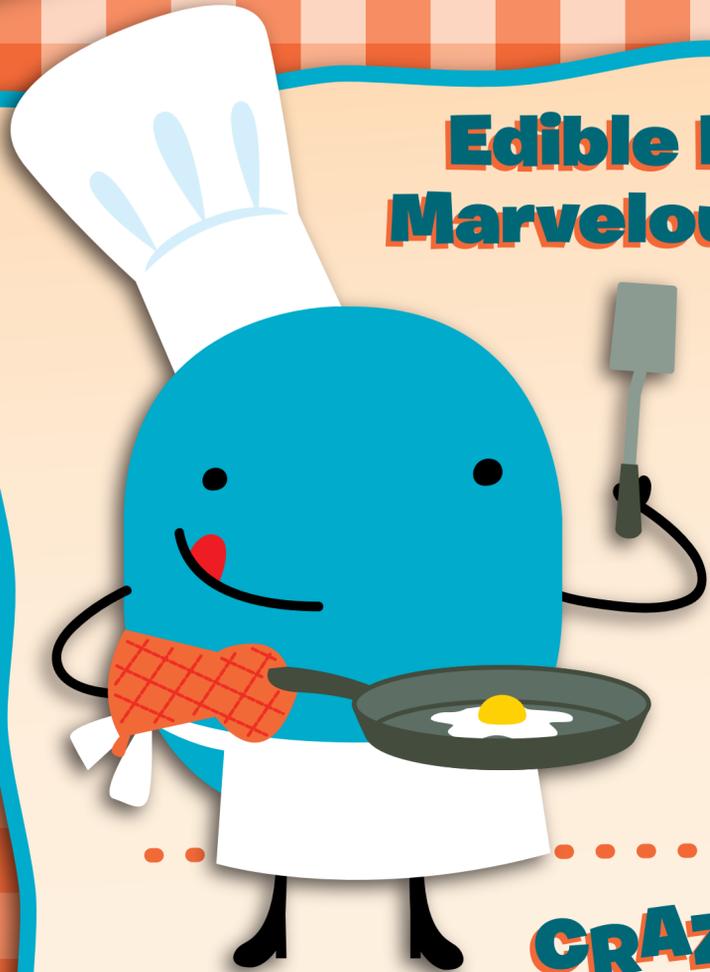
Ryans.com

Offer expires 2/28/15.

Science on the Menu

Whether it's your own kitchen or a family restaurant kitchen, meals are always served with a side of science... Believe it or not!

Edible Emulsions & Marvelous Molecules!

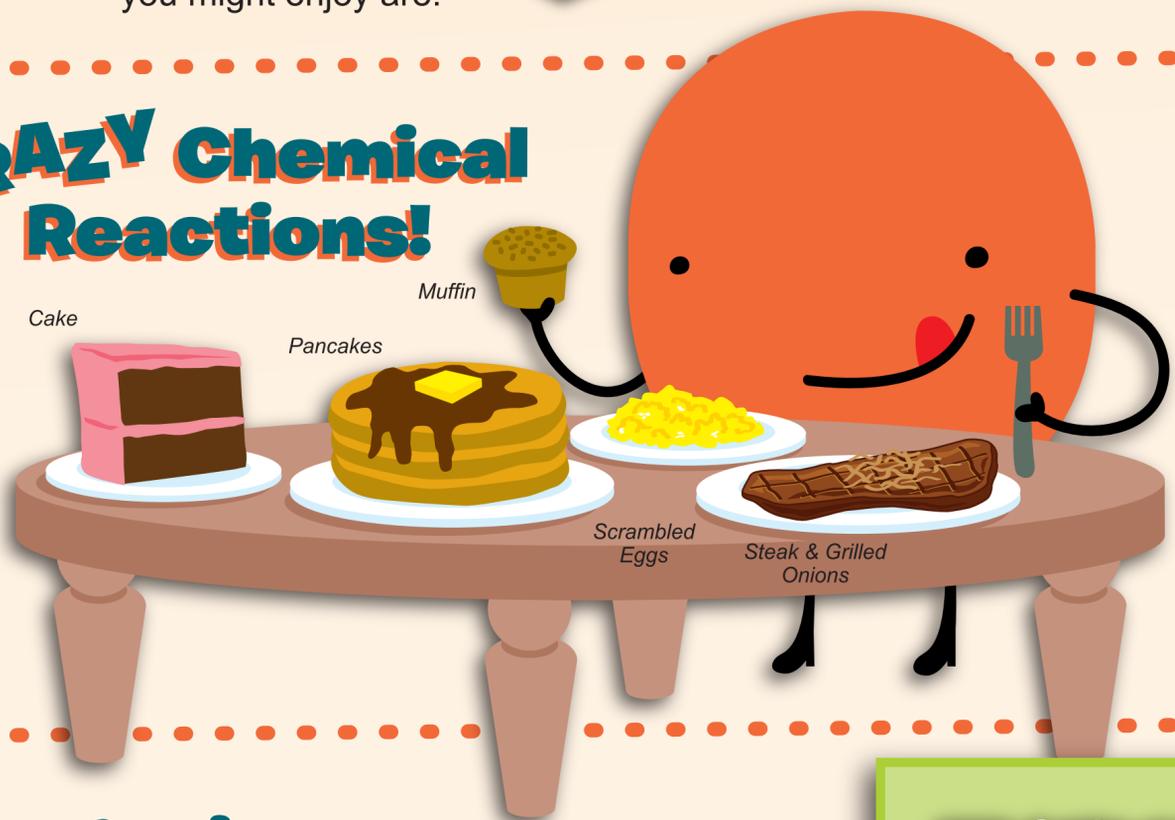


Oil and water-based molecules become happy together with the help of an **emulsifier**, a substance that **allows oil and water molecules to mix and stay that way**. Some **edible emulsions** you might enjoy are:



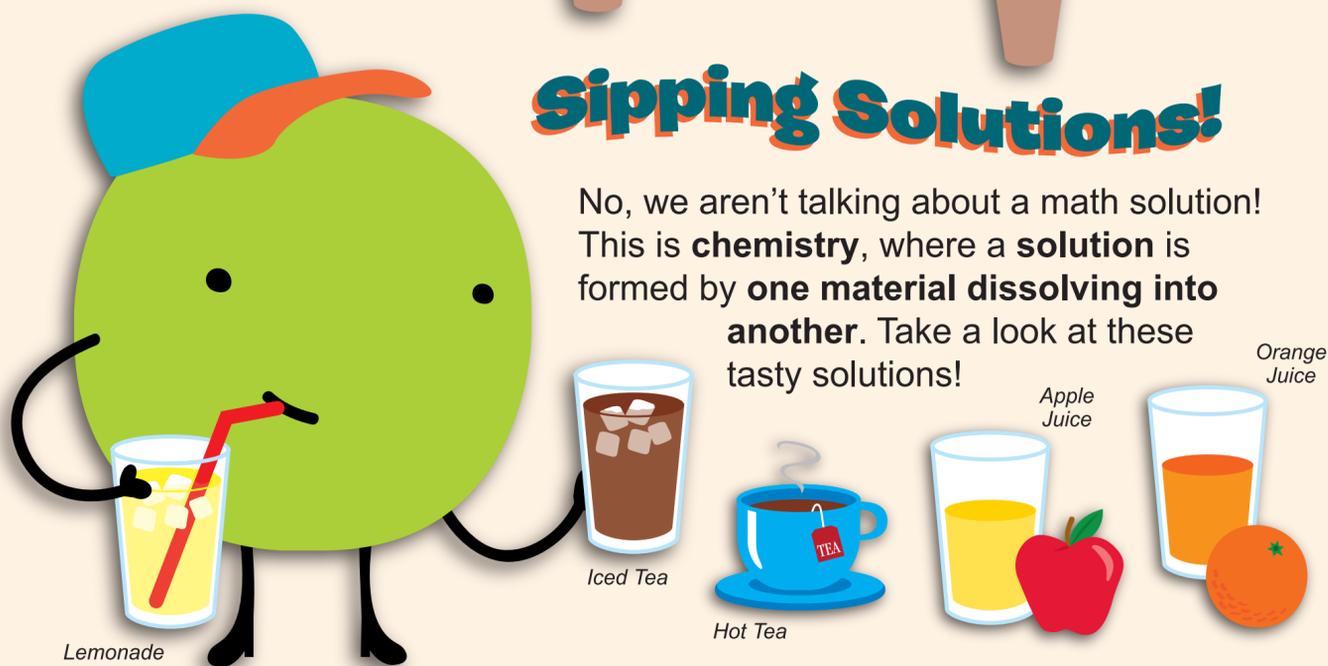
CRAZY Chemical Reactions!

Chemical reactions in the kitchen cause breads to **rise**, meats and pastries to **brown**, and many foods (like eggs!) to **change their physical characteristics**. Chemical reactions in the kitchen help make these favorite foods:



Sipping Solutions!

No, we aren't talking about a math solution! This is **chemistry**, where a **solution** is formed by **one material dissolving into another**. Take a look at these tasty solutions!



Ryan's®

Ryan's chefs know their science when it comes to preparing delicious meals for your family to enjoy. The next time you visit, look around on all the bars to find examples of tasty kitchen science everywhere!

Ryans.com

