

CHEMICAL PROCESSES

Structured Inquiry

Inquiry Summary

What inquiry can we have from chemical reactions?

In this inquiry, the students and teacher investigate chemical reactions required to raise pancakes, create appropriate inquiries to determine solutions Uncle Zeke's problem, and learn chemistry fundamentals.

Standards

Oregon Common Curriculum Goal

Understand chemical and physical changes.

Benchmark 3

- Distinguish between examples of chemical changes and physical change.
- Recognize the difference between chemical and physical changes in matter.
- Describe events that accompany chemical changes but not physical changes

Part 3: Uncle Zeke's Pancakes

Chemical Reactions-Structured Inquiry

Objectives

Students will:

- Describe events that accompany chemical changes.
- Design, perform and analyze results of chemical investigations.

Just Bake one
pancake

Materials

Flour
Salt
Sugar
Cream of Tarter
Baking powder
Soda
Critic acid
Alum
Milk
Buttermilk
Water
Vinegar
Apple juice
Orange juice

Preparation

Make pancakes using the following:

2 cups flour

½ teaspoon Salt

1 Tablespoon sugar

2 tablespoons oil

2 cups milk

** Note this recipe has no leavening

Safety

Usually, the rule is never to taste any chemicals. In this investigation, tasting is approved. All materials are food quality.

Getting Started

- What is Uncle Zeke up to now???
- Read the Uncle Zeke's Pancake story interactively with students. Stop periodically to allow students to ask questions and predict what Uncle Zeke will do next.
- Offer students a sample of Uncle Zeke's pancake. (Prepare several pancakes from the basic recipe, which contains no leavening.)
- Collect their questions and ideas on an overhead or board.

Where did Uncle Zeke goof??

Background

What did Uncle Zeke know about making pancakes? (Be sure to list Uncle Zeke ingredients).

What do we need to know about pancakes? Discuss these questions with students; list their ideas on an overhead or board. (Be sure to list Uncle Zeke ingredients.)

1. To begin the exploration, help students observe the physical properties Uncle Zeke's pancake.
2. Give student a cup of the basic pancake mix, and Uncle Zeke's unknown white powders and various liquids. Allow students time to design an investigation to answer the Uncle Zeke question. Students can use a combination of one or two white powders and one liquid ingredient. Tell them you will help them cook a sample of their pancake solution. A mini lesson comparing observations of 'real pancakes' (bubbles form when cooking) and the chemical reaction of combinations of the ingredients. The proof of their success will be in the cooking! However, students can make several combinations before deciding on one to cook.

3. Tell students once their investigation design is complete, they must create a method to record the data their investigation will produce.
4. Review student plans before allowing investigations to begin. Make sure the plan is feasible, and includes a data recording method, chart or table. They should explain their findings (conclusion and analysis) when they finish.
5. Allow time for students to conduct their investigation, record data and conclusions.

Ending the Inquiry

After students have completed their inquiry, make sure they understand the chemical process utilized to create carbon dioxide gas to make raised pancakes.

This lesson is a structured inquiry because the teacher provides the context, and question, and pancake mini lesson instruction, but students develop their own procedure, design the data recording method, conduct the investigation and explain the investigation results.

Assessment

The content objectives can be assessed by an analysis of student's explanation of their findings. Did their explanation contain data that correctly evidenced a chemical change? Did student attempt to make sense of the chemical process that created their pancake solution. Process or inquiry objectives can be assessed through students overall inquiry design using the state inquiry-scoring guide.

Uncle Zeek in the Kitchen

By Michael Jaeger

Now Uncle Zeke, the lucky geek,
Had married well and married often.
His latest bride was fit, not wide
And cooked his meals like food store boughten.
Each morn sweet Angeline would brew
Golden pancakes, prunes or stew.
Until old Zeke would coo
With each forkful: Angeline, I love you.
For in each menu, recipe, and mixin'
Were perfect tastes and blends and fixin'.

One day in spring his sweet bride
Announced quite suddenly with pride
"I'm off to see my sister in Azuza"
"You'll find the menu for the day
Over yonder, there it lay.
Fixin's on the shelf right there,
Bowls and such sit over here.
Just follow my directions and you will see
Cookin's easy as fallin' out the ol' apple tree.

Uncle Zeke felt quite the terror
For in cooking he was prone to error.
"Oh sweet Angeline do not go,
Your cookin' makes me love you so!"
"Now Zeke be still you silly goat
I'll be back before you'd note.
You can fix a meal or two
And last til sky's more black than blue."

An hour passed and then another.
Uncle Zeke could last no longer.
A hungry stomach began to bother.
Resolved to dive into the fodder.
List of ingredients – a recipe
Pancakes al la mon de neige.

"Sounds so fancy, quite exotic
Murmured Zeke: the cook idiotic
A cup of flour, and o' sugar, a teaspoon salt,
Two dashes soda, mix, stir and halt.
And finally,
One dash crème of tar-tar-e,

Pour in vanilla, oil and milk
Blend til smooth and soft like silk."

"You can do this, Zeke you fool.
Just follow directions, this will be cool."
Reaching to the shelf for fixin's
Down he fetched the dry white mixin's.

"Which one is which?" He hooted and cried .
They's all the same, they can't be eyed.
Five white powders all ground the same,
Cain't tell 'em apart, don't know their name.
"I'll just guess," Old Zeke did offer,
A little liberality should proffer.

A whirring splashing wisk did flew
Scattering spattering powders astrew.
"All ready" he boasted—a battered man,
"Now to the stove for a hot greasy pan."

Pouring his pancakes onto the griddle,
The batter did spit and the drips did driddle.
"These don't look like those of Angeline's,
Mine are grainy, lumpy, not so fine."

The first two flapjacks flipped with glee
Onto a plate, Zeke tittering, heehee.
One last ingredient atop of those hunns,
Powdery sugar like snow on the mons.
"Hope this one's it" as he shakes a bog dollop,
Atop the cake it lands with a pollop.

Sitting up to take a first bite
Zeke wields a fork full to fight.
Into the mouth the cake he did munch,
His eyes they did pop and buckle and punch.
Out he spat the villainous concoction,
"You knucklehead, you goof, you moron, you doof!
This pancake's like poison! I could have been killed!"

Scraping the mess into the trash,
He mumbled and crabbed, "Oh what an ash."
Down to the cupboard he peered deep back and under
"There, I can see it, I do have the means –
I know I can't mess up a cold can of beans!"