Chemical Reactions Project

Owl ~ St. Matthew, School Age 1

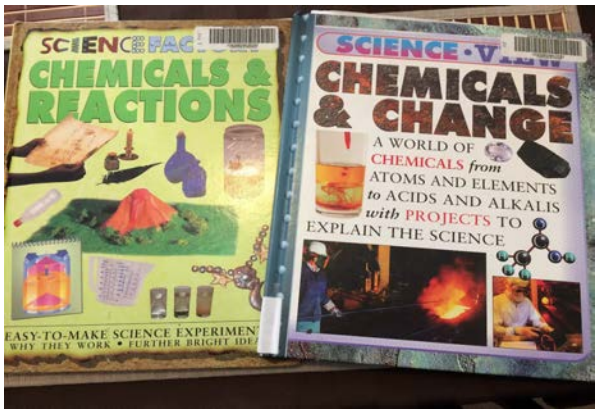
Background

Our chemical reactions project started at the beginning of March 2017 and finished at the end of June 2017. The children who participated in this project were our School Age Group 1 children whose ages ranged from 4 years to 5 years. The staff that were involved in this project were Courtney Taylor, RECE and Josephine Allishaw, RECE.

Phase 1: Beginning the Project

Phase 1 of this project started with a simple cause and effect experiment that involved baking soda and vinegar. The children started making their own predictions as to what was going to happen with the experiment. Sebastian and William said, “I think it will blow up!” The children watched as bubbles started to rise, which was very exciting! After the experiment, many questions were asked such as “Why did it start bubbling?” and more. The staff and children started researching experiments to try that involved chemical reactions, which expanded their curiosity even more! The staff and children found an experiment that involved a lemon, baking soda, dish soap and vinegar, which was really cool and smelled great afterwards! The children were excited to learn and expand more on this topic. This is how our experimenting and exploration of chemical reactions started. We then made a list of what we know and what we want to know about chemical reactions. After some brainstorming we created a web and a list of some of the experts we can to talk to.

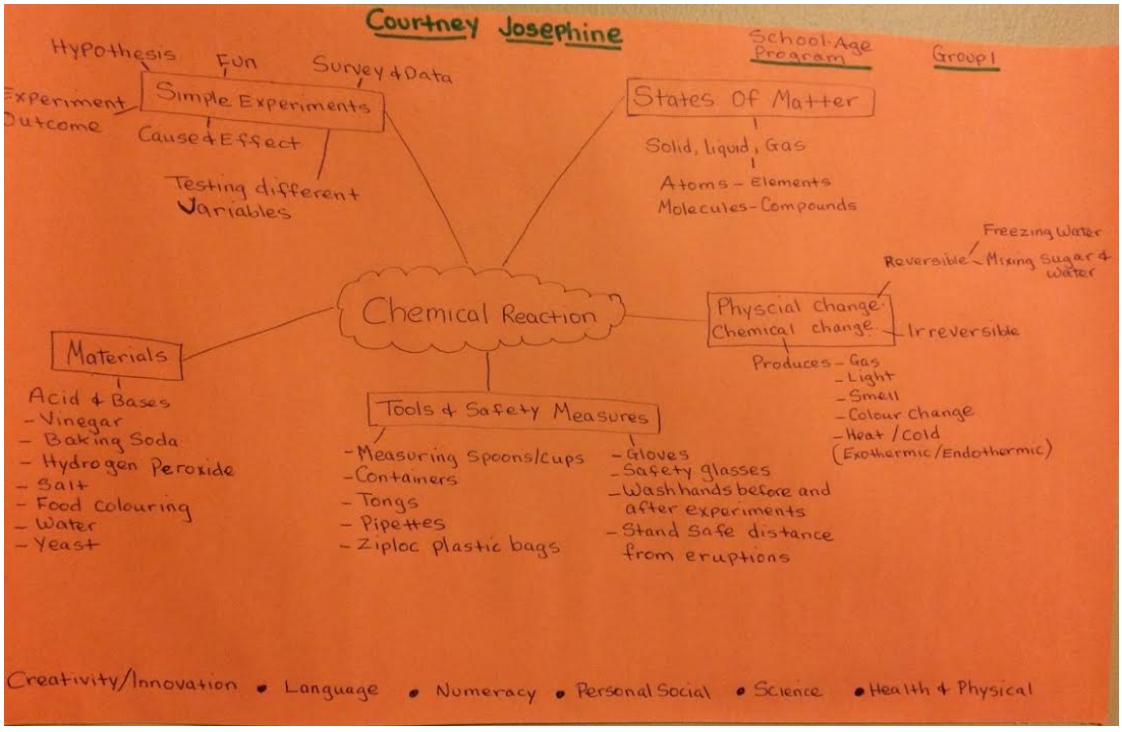
The children are exploring with the lemon “eruption” experiment!



Here are books that Josephine brought in for our research.

What do we know?	What do we want to know?	Whom can we ask?
• There are lots of bubbles and smells • We use different types of powder • Experiments can feel slimy, dry, sticky and more!	• How do we do experiments? • Why do we do experiments? • Why do experiments bubble so much? • Why do experiments explode? • Why do experiments get hold/cold?	• Kent's Dad, Mike Cinelli

Chemical Reactions Web



Phase 2: Developing the Project

Formal Meaning of Chemical Reactions

A process in which one or more substances, the reactants, are converted to one or more different substances, the products.

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Informal Meaning of Chemical Reactions

Mixing ingredients together makes it bubble and change.

The science of Bubbles
Leading up to the survey, the children wanted to explore different types of reactions, which lead to exploring with types of bubble solutions. For this activity, different types of dishwashing liquids were used to create a number of variables.

How different types of bubble solutions work.

Different types of bubble solutions	Which solution makes the shortest/longest lived bubble?	Which solution makes larger/smaller bubbles?	Which solution makes many or few bubbles?	What happens when you blow bubbles slow/fast through a straw?
Dawn dishwashing liquid, tap water	Short lived	Small	Many	Fast- nothing Slow- few bubbles
Store brand	Short lived	Small	Many	Same
Tap water, glycerin, Sunlight dishwashing liquid	Popped after 5 seconds	Bigger	One	Fast- nothing Slow- single big bubble
Distilled water, sugar, glycerin, Palmolive dishwashing liquid	Popped after 20 seconds	Bigger	One	Fast- nothing Slow- a large bubble
Soap water, Ultra dawn, glycerin, sugar Popped after 30 seconds	Biggest	Few	Fast- nothing Slow- a couple of bubbles	

What we discovered

The children discovered that there were varying results with the different solutions. During the activity, the children learned about reactions as they blew bubbles. As the children blew bubbles slow and fast, we charted the results. The children came to realize that blowing the bubbles slowly had a better effect. Blowing the bubbles fast caused the bubbles to pop right away.

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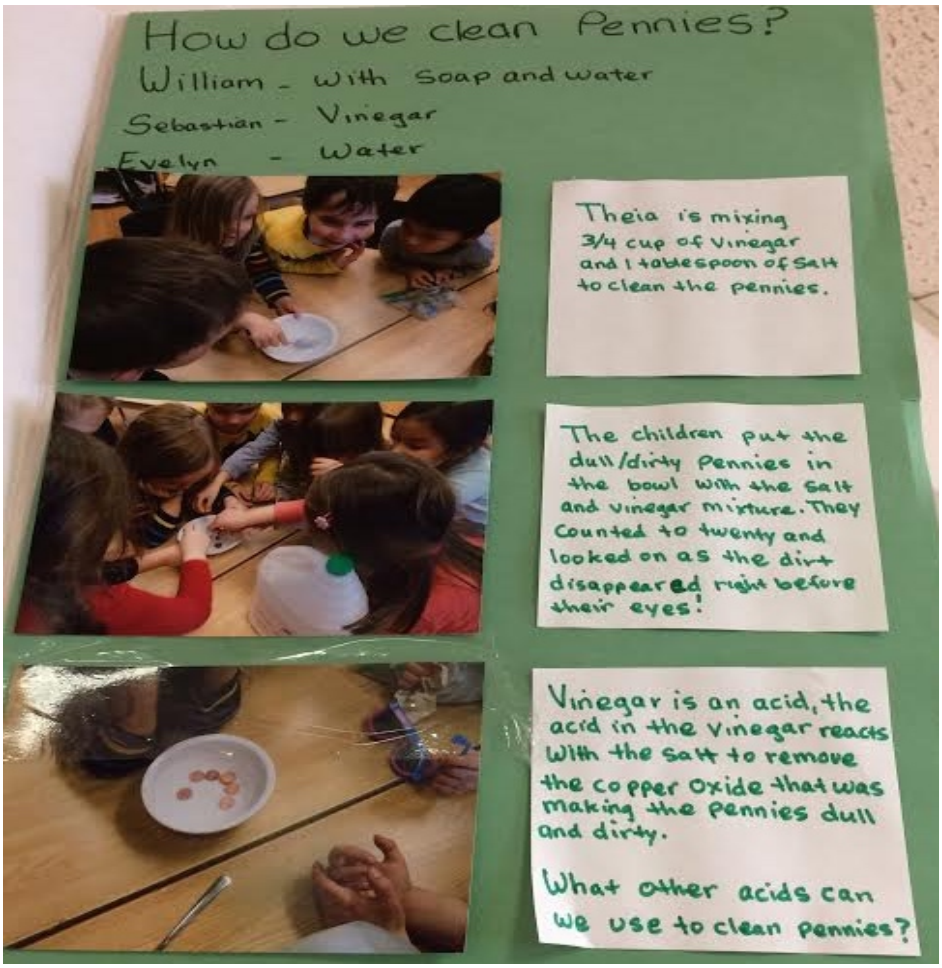
Cleaning Pennies

The children were interested in what vinegar does. We decided to see what it does to pennies when they are dropped into vinegar and salt.



The children mixed ¾ cup of vinegar and 1 tablespoon of salt to create a solution. The children then put dull dirty pennies into the vinegar and counted to 20 while they waited for the results. They looked and the dirt was starting to disappear! We discovered that the acid reacts with salt to remove the copper oxide that was making the pennies dull looking.

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Ice Cream in a Bag

To explore more with reactions, we decided to make ice cream from scratch. The children read and sounded out the words written on the milk carton as they talked about different types of milk and talked about which ones would be best suited for making ice cream in a bag. The ice cream recipe we found online required: 1 cup of whipping cream, 1 ½ tablespoons of vanilla and 4 teaspoons of sugar. The children helped to measure the whipping cream, vanilla and sugar into the sandwich size Ziploc bag. The excess air was squeezed out as the bag was sealed and placed into another tightly sealed sandwich bag. Next, the children filled a large Ziploc bag halfway with ice and added one cup of kosher salt. The sealed sandwich bag was placed into the ice, and then the larger bag was tightly sealed. Each child took turns shaking the bag. Logan's mom helped to shake the bag as it became too cold and slippery for the children to hold. Salt mixed with ice causes it to melt which lowers the freezing point of the ice. By lowering the temperature at which ice is frozen, it creates an environment in which the milk mixture can freeze at a temperature below 32 F into ice cream. The children enjoyed the ice cream and said it was "Yummy and delicious!" The children want to do the experiment again, except next time they will wear winter gloves and triple the ingredients to make more ice cream!

Logan's mom helping to shake the ice cream.

Matthew(5 yrs) and Amelia(4yrs) enjoying their homemade ice cream!

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A Visit From our Expert

One of our parents, Mike Cinelli, came in to teach us about a different type of reaction- physical reactions. Kent's dad Mike is a professor at Wilfrid Laurier University and specializes in action and perception. He brought in rulers and held one between the children's fingers; to test their physical reactions, he would let go of the ruler without telling them. The object of the activity was to test how fast they reacted to the object falling between their fingers.

Mike is teaching the children about a different type of reaction called a "physical reaction".

The children used the iPad that Mike provided, which had a special game that tested their reactions. As soon as they saw the red button, they had to touch it as fast as they could before it disappeared!

Mike is holding a ruler in between Layla's (4yrs) fingers, watching for her reaction as he dropped it.

Fizzing Colours

Since the children are so interested in baking soda and vinegar, we decided to try adding food colouring to the mix for this experiment. The children used eye droppers to add food colouring to the baking soda and vinegar.

The children are using eye droppers to add food colouring to the baking soda and vinegar.

Curdling Milk

Our interest in reactions continued as the children asked to do more cause and effect experiments. One day, we did some baking and used a recipe that involving curdling milk. The children had many questions about vinegar and milk and how they work together. We decided to do further research into it and found an experiment called “Turn Milk into Plastic”. The next day, we used 1 cup of hot milk and then stirred in 4 tablespoons of vinegar. The vinegar started to clump as the acid in the vinegar broke down the protein in the milk. Jaime and Sebastian said, “The milk and vinegar are starting to blob together!” This process term is called “curdling”. We used a strainer to get rid of the excess

liquid, so that our plastic could dry. Next time, we will double the ingredients as the recipe we followed made only a very small amount of plastic.

Jaime (5 yrs) and Sebastian (4yrs) are helping Courtney to stir vinegar into the hot milk.

Straining the excess liquid from our milk and vinegar mixture.

Exothermic Reaction

Our curiosity continues when it comes to chemical reactions! We are looking into reactions involving heat. For this activity, we used hydrogen peroxide, dry yeast, dish soap, warm water, food colouring and a water bottle to create “Elephant Toothpaste”. The children watched as the ingredients were added to the water bottle and the mixture instantly started to bubble and rise! The yeast helped to remove the oxygen, which created many bubbles! This is called an exothermic reaction.

Layla (4yrs), Chloe (5 yrs), Lincoln (4 yrs) are patiently waiting to measure ingredients for our Elephant Toothpaste activity.

Matthew (5yrs) watching as the ingredients bubble out of the water bottle. “It looks just like toothpaste!”

Emily (4yrs), Sebastian (4 yrs), and Theia (4 yrs) are feeling what our Elephant Toothpaste feels like. The children said the sensation felt “really warm”.

Reactants

What are the contributing factors to chemical reactions? After a few cause and effect experiments, the children were very curious to know the reasoning behind chemical reactions therefore, we took a deeper look into how it all works. In a chemical reaction, the molecules and atoms that mix are called reactants. We thought it would be fun to make molecule and atom structures. For our atom structures, we used toothpicks, mini marshmallows, Styrofoam balls, and wooden skewers for our molecular structure.

Once our structure was complete, the children started painting it red and blue. Matthew (5 yrs), Nicholas (5 yrs), Sebastian(4 yrs), Theia(4 yrs) working hard to cover the Styrofoam balls with lots of paint.

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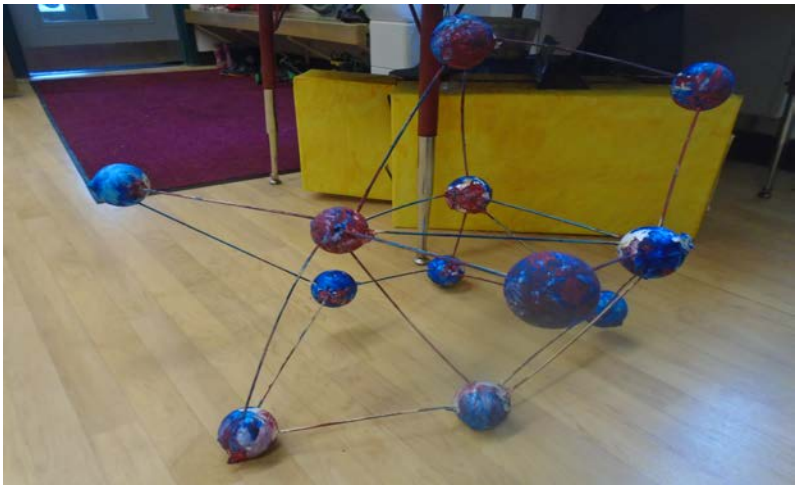
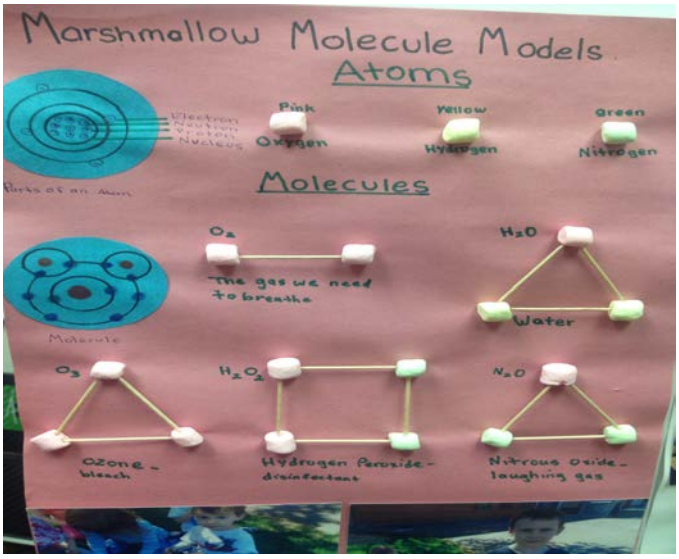
The children are making individual atom structures using mini marshmallows and toothpicks. They attached the marshmallows to the toothpicks.



Here is our finished molecular structure for water (H2O).



After doing a bit of research, we created a chart of all the different symbols for molecules and atoms. Definitions were included underneath each symbol.

Chalk Paint

What happens when you mix plaster of paris, tempura paint and water together? The children took turns stirring the ingredients together to create chalk paint. As soon as we started painting on the pavement with it, it started to dry!

Evelyn is stirring the ingredients together before taking it outside to test out.

It worked great on the pavement!

Phase 3: Ending the Project

Our project lasted four wonderful months! By the end, the children started losing interest and started doing other things like building with blocks to make various creations. To end our project, we decided to have our own science fair! We included all of our favourite activities that we've done over the past months in our fair. We made yummy brownies for all of our families to enjoy as well. During our

science fair, we set up all of our favourite experiments, which included Elephant Toothpaste, Lemon Eruption, Building Atoms with Marshmallows and Toothpicks and more! We had instructions for each experiment, so that our parents could perform these experiments with their children!

Jaime showing her mom our project board.

Teacher Reflections

Courtney's Reflection

We had great experiences during our chemical reactions project! As the children asked questions, I found myself learning new things I never knew about before as I did further research into the topic. The children had fun learning about the different chemical reactions. As we continued with the project, we expanded into molecules, atoms, surface tension and so much more; this project just kept going. If you really think about it, chemical reactions are occurring all around us! We made so many discoveries during this project and were able to incorporate our science and numeracy skills in such a fun way. It is amazing how much we were able to expand on during this time. With every single experiment, we thoroughly enjoyed exploring using all of our senses. There would be days during which the children were having so much fun exploring, that they did not want to leave! We ALL had so much fun. I am very happy that we shared our learning with parents during our project and at the end. The children were able to teach their parents how to do the experiments on their own! It is the greatest feeling ever! We cannot wait to see what we will do for our next project!

Josephine's Reflection

This project started out as a fun activity that the children enjoyed doing in the after school program. The children were curious to know why things fizzle, explode, change colours, texture or temperature when combined. Working as a co-learner with the children to find answers to these questions required lots of research. I found that using interactive videos on YouTube such

as makemegenius.com and Matter Chatter were more effective in teaching basic scientific terms and concepts to children. As the children explored sates of matter, they learned that everything around us is made up of solids, liquids or gases. They used their five senses as they discovered how two or more chemicals reacted when they were combined. Their vocabulary has expanded as they learned new scientific terms, and their social/emotional skills increased as they worked collaboratively with each other testing different variables, making predictions, and discussing experiment outcomes. When the parents came to visit at the end of our project, some of them said that their child talked about the science experiments that they did during the day and that they looked forward to coming to the after school program.