Racquel Grant

Unit name: Kitchen Chemistry: exploring chemical change

Lesson # 6: "Dancing Raisins" "Adapted from: Change Detectives-Stage 3 Natural and Processed Materials, Australian Academy of Science (2012), and Science Fair Projects retrieved on 22/10/14 from: www.all-science-fair-projects.comprint_project_1069_39."

Prior Knowledge:

Physical Change: is a change in which no new substance is used.

Chemical Change: is a change that results in the conversion of the original substances to form new Substances.

Key Scientific Knowledge:

When Sodium bicarbonate is added to the vinegar solution (Acetic acid), a chemical reaction occurs resulting in Carbon dioxide gas, water (H20) and the Sodium acetate ions (which are dissolved in the water).
It is the Carbon dioxide gas that forms into bubbles and because they are less dense than the vinegar solution they float to the top of the solution.
Reference: "Science Fair Projects', retrieved from: http://www.all-science-fair-projects.com/print_project_1069_39, retrieved on 21/10/2014.

Pertinent Loan of Knowledge:

- Bubbles of carbon dioxide (little pockets of gas) are formed by combing the vinegar, water and Bicarbonate soda, because they are lighter (or less dense) than the vinegar solution. They float to the top of the liquid, making the raisins dance.

Science & Technology Outcomes & Indicators:

Skills-Working Scientifically

Students will:

ST3-4WS-Investigate by posing questions, including testable questions, making predictions, and gathering data to draw evidence-based conclusions and to develop explanations

- With guidance, posing questions to clarify practical problems or inform a scientific investigation (ACSIS231, ACSIS232)
- Predicting what the findings of an investigation might be
- Applying experience from similar situations in the past to predict what might happen in a new situation

Students will plan investigation by:

- With guidance students will plan appropriate investigation methods to test predictions, answer questions or solve problems using a fair test (ACSIS086, ACSIS103)
- Deciding which variable should be changed and measured in fair tests while keeping everything the same (ACSIS087, ACSIS104)
- Gathering data first hand

Students will conduct investigations by:

- Working individually and collaboratively in conducting a range of appropriate investigation methods including fair tests to solve problems
- Using equipment and materials safely, identifying potential risks (ACSIS088, ACSIS105)

Students will process and analyze data and information by:

- Using a graph to construct representation
- Using numerical techniques to analyze data
- Drawing conclusions and explanations based on data and information gathered
- Reflect on gathered evidence in relation to their own and others' conclusions
- Using a variety of ways to communicate ideas including written and oral texts (ACSIS093, ACSIS110)

Knowledge and Understanding-Material World

Students will:

- Identifies the observable properties of solids, liquids and gases, and that changes made to materials are reversible or irreversible
- **(ST3-12NM)**
- Describes how the properties of materials determine their use for specific purposes **(ST3-13NM)**

Other Key Learning Area's

English

-Identify and explain how analytical images, tables, diagrams, maps and graphs contribute to our understanding of verbal information

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- Represent results to decide what factors affect the speed of a chemical reaction
- Summarize their findings about what factors affect the speed of a chemical reaction
- Engage in discussion to compare ideas and provide relevant arguments to support their conclusion

Equipment for class:

- Class journal (Large scrap book)
- Word Wall

Equipment for each team of 4

- Each student's science journal (back of science book)

• 1 enlarged copy of “Raisin investigation planner” • 1 jug • 1 glass of water • Hot water • Room temperature water • Ice-cold water • Interactive whiteboard timer	• 1 A4 copy of “Raisin investigation planner” • 1 large glass jar • ½ Cup of vinegar • 2 Tablespoons of Baking Powder • A hand full of raisins • Tap water • Copy of “Procedure sheet”

Lesson Steps

1. Ask any students if they have ever taken any medicine or vitamins which fizzed in water.
2. Discuss what kind of change it is. Discuss why the tablets are designed to fizz (to make it to be absorbed by the body-quicker)
3. Explain that students will be working in cooperative learning teams to investigate the rate of the dancing raisins.
4. Ask students to brainstorm what things (variables might affect the rate of this reaction, such as:

- Amount of baking soda
- Amount of vinegar
- Amount of water
- Temperature of liquids

5. Record the students’ answers in the variables grid
6. Model how to use the variables grid to plan a fair test by only changing one variable and keeping all the others the same. For example, if they investigate the effect of water temperature on the rate of the reaction, students might:

- **Change** the temperature of the liquid
- **Measure/Observe** how long the raisins ‘dance’
- Keep the **same:** the amount of soda, the amount of vinegar, amount of water, the type of container, the size of the container.

7. Discuss why replication is necessary to produce reliable results and list possible reasons for variation (for example discrepancies in human measuring). Ask questions such as:

- Do you think it will happen the same way every time?
- How will that affect the result?
- How will that affect what we think?

8. Introduce students to the process of writing questions for investigation. Model the development of a question, for example, “What happens to the rate of the reaction when we change the temperature of the liquid?’ Ask questions such as:

- What do we want to know?
- How can we find this out?

9. Introduce the enlarged copy of “Raisin Investigation Planner”. Discuss the ‘results’ section of the planner and explain that each team will conduct a test using liquids of each temperature. Each team will then join with two other teams to discuss their results and calculate and plot their averages on the graph in the “Presenting results” section of the “Raisin Investigation Planner”. Review the purpose and features of the graph and how to construct a line graph.
10. Form teams and ask students to decide on ‘who does what/allocate roles?’ Ask team managers to collect a copy of the “Raisin Investigation Planner” for each team member.
11. Ask teams to plan their investigations on the ‘Raisin Investigation Planner’.
12. Ask team managers to collect equipment and allow time for students to conduct the investigation, results” section of the “Raisin Investigation Planner”
    Remind students of the precautions for handling hot water and unknown chemicals.
13. Analyze and compare graphs as a class and look for patterns and relationships, asking questions such as:

- What is the story of your graph?
- Do the data in your graph reveal any patterns?
- When did the raisins dance for the shortest time?
- At which temperature did the chemical reaction go fastest?
- Can you use the graph to make predictions?

14. Ask students to reflect on the investigation and respond to the questions in “Explaining Results” and “Evaluating the Investigation” sections of the “Raisin Investigation Planner”.
15. Ask students to summarize what they have learned in their science journal. Update the “Word Wall” with words and images.

Simplification:	**Extension:**
• Decrease the amount of variables by providing the same water amount • Or, keeping the temperature the same • Or, keeping the vinegar amount the same	• Increase the amount of variables by providing more varieties of containers to offer more surface areas.

Evaluation:

Appendix:

A- Raisin Investigation Planner (As adapted from: “Tablet investigation Planner”, Australian Academy of Science, 2008)