

The Scientific Method

Introduction

Science uses a unique method to investigate nature. The method is called the scientific method and can be summarized in five steps:

1. Hypothesis
2. Experimentation
3. Observation
4. Theorization and
5. Communication

Facts are obtained from experimentation, observation and measurement. Theory can help by predicting what to look for or by indicating an area of further experimentation.

In an experiment it is important to consider variables that are manipulated and the variables that are responding.

Also, any conditions that may matter or may influence the observations, i.e. controlled factors must also be considered.

Make your observations as completely as you can. Remember to make qualitative as well as quantitative observations.

Make sure that you are able to distinguish between an observation and an interpretation, (i.e. inference).

Each step of the procedure should result in an observation which in turn, should be used to draw an assumption or a tentative conclusion.

Materials

6 - 8 dry unpopped popcorn kernels, 250 mL beaker, 10 mL baking soda, 20 mL vinegar, stirring rod, timer

Procedure

1. Make a hypothesis for the purpose, (problem, aim, objective)
2. Prepare suitable data tables.
3. Place 200 mL of water into a beaker, add a few kernels of corn. Record your observations in the appropriate data tables.
4. Add the baking soda to the beaker of water and the kernels of popcorn. Stir to dissolve fully. Record your observations.
5. Add the vinegar to the solution. Record your observation initially and for the next 5 -10 minutes.

Data Analysis

1. Compare the results that you obtained using (a) water, (b) water with baking soda, (c) water with baking soda and vinegar.
2. What were the bubbles observed in the solution, and where did they emanate from?
3. What reaction caused the bubbles to form?
4. What was the initial cause of the first movement of the popcorn kernels from the bottom of the beaker?
5. What was the possible cause of the final movement of the popcorn kernels as they appeared on the surface of the solution?
6. Why was there no movement of the popcorn kernels observed after a duration of time?

Conclusion

1. Was your hypothesis correct or incorrect? Explain
2. Why was a movement of the popcorn kernels, (the 'dance' of the popcorn kernels), observed in the water-baking soda-vinegar solution?
3. State some observations you made as opposed to the inferences you made in this experiment.
4. Can this experiment be repeated using rice, kidney beans, raisins, dried peas, or paper clips instead of popcorn kernels? Explain.
5. Can the same experiment be repeated by replacing the baking soda with sugar or salt? Explain.
6. Was there any stage in the experiment where a physical change was observed. State the criteria used that indicated a physical change had taken place?
7. What evidence is there that a chemical reaction was occurring in the water-baking soda-vinegar solution?

Application

Is there an application of this experiment in baking of cakes, cookies or muffins?