

○ Question: How does removing calcium from bones with various liquids affect bone strength?

Introduction: In this experiment we are looking to see out of three liquids which will effect the bone strength. In order to do this we will put three bones into 3 liquids (water, vinegar, and bleach). We will take data by first weighing the bone and then weighing both the bone with a piece of paper towel. By doing so we will see how the removal of calcium affects the amount.

○ Variables: Independent variable: Chemicals
Dependent variable: Change of calcium levels; Strength of bone
Constants: Chicken bone - amount of chemicals

Hypothesis: If you place the bone inside the coke then the calcium levels and strength of the bone will decrease because the coke will sink into the bone and soften it.

Equations: N/A

Materials: 30 mL Vinegar (Acetic Acid) Paper towels
30 mL coke 30 mL Bleach
30 mL water 30 mL Isopropyl alcohol

○ Produce: (1) Obtain three beaker/cups and label one with a "W" for water, one with a "V" for vinegar, and the other with a "X" for liquid of choice.

(2) Using the graduated cylinder, measure out 30 mL of water and pour it into the beaker/cup labeled "W".

(3) Using the graduated cylinder, measure out 30 mL of vinegar and pour it into the beaker/cup labeled "V".

(4) Using the graduated cylinder, measure out 30 mL of chosen liquid and pour it into the beaker/cup labeled "X".

(5) Choose three chicken bones and remove all excess muscle from the bone. Dry off the bones with a paper towel. Make sure to wash your hands after handling raw chicken.

○ (6) Obtain a paper towel and scale, weigh the paper towel.

(7) With a paper towel on the scale weigh each chicken bone separately. Subtract the weight of the towel from the total weight w/ bone and record bone's weight in as the starting weight for each column in the table.

(8) Place a bone in the beaker/cup containing water. Make sure the bone is completely covered. If it is not covered, then add more water.

(9) Place a bone in the beaker/cup containing vinegar. Make sure the bone is completely covered. If it is not covered, then add more vinegar.

○

40) onward.

... the bone is completely covered. If it is not covered, then add more bleach.

(11) make your initial observation of the bones. This could include the bones color, texture, smell, firmness, etc.

(12) Place all three beakers/cups in a safe place where they will not be disturbed. Use a piece of paper or paper towel with your group name placed under the beaker/cups to identify them. The bones will be observed and weighed at the end of five days.

(13) Wash your hands with soap and water every time you handle the chicken bones.

Observations: (1)

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The bone in the beaker of bleach was fizzing but the bone in water and vinegar wasn't showing any fizz.

After 5 days procedure:

(1) Remove the bone from the water beaker/cup and dry it off on a paper towel

(2) Obtain a paper towel and scale weigh the paper towel.

(3) Place the bone on the paper towel and record its weight in grams. Subtract the weight of the towel from the ~~total~~ total weight w. bone and record weight of the bone in grams. Make a note of any visual observations as well.

(4) Repeat step 2 for the other

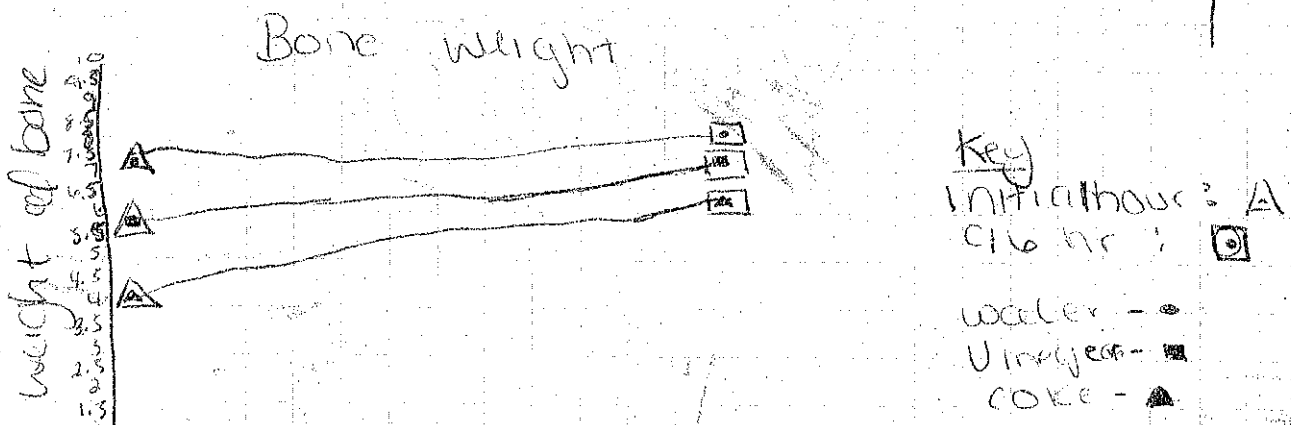
○ Data and Calculations:
 weight of paper + towel = 0g

Table 1. Bone Weight

Time Period	water (control)		Vinegar		bleach / coke	
	weight of paper towel + bone (g)	weight of bone (g)	weight of paper towel + bone (g)	weight of bone (g)	weight of paper towel + bone (g)	weight of red bone (g)
Initial (0hr)	7.1 g	4.7 g	5.6 g	5.6 g	4 g	4 g
96 hrs	8.3	8.3	7.2	7.2	6.2	6.2

Table 2. Bone observations and weight

Time Period	water (control)		Vinegar		bleach / coke	
	weight	observation	weight	observation	weight	observation
Initial (0hr)	7.1 g	wet, just about the same	5.6 g	looks the same	4.0	Disolving, bubbles are coming up
96 hr	8.3 g	raw white redish	7.2 g	raw white red, maroon	6.2	raw, white red marrow



Discussion:

(1) What liquid did you and your partners choose to soak chicken bone (in)?

Coke

(2) Why did you choose that particular liquid?

It seemed interesting

(3) Compare and contrast the three bones placed in the various liquids.

Water - hard, pinkish, vinegar - flexible, soft, brown color, Coke - hard, black color

(4) ~~Was~~ Was there any evidence that calcium was removed from any of the bones? If so, what was it? From which liquids was the calcium removed?

yes, the vinegar removed the calcium making the bone flexible, bendable, and brown

(5) Why do you think the liquids had the effect they did on the bones? What did those liquids have in common?

Because they had time to sink into the bone. After 9 hours they weighed more and the color changed.

Conclusion:

• my hypothesis was correct
 • 2 pieces of evidence that proved my hypothesis to be correct.

○ CONCLUSION (continued):

(2) Sitting in the liquid for so long.

○ Sources of error:

(1) Time wasn't exact so

maybe it was less than 9 hrs

(2) The bones weren't the

same size.

○ Things to change in the experiment:

(1) Try regular coke and diet

coke

(2) Checking the bones everyday

○ Two questions about experiment:

(1) Why is it so easy for the

bones to soak up liquid? Will it do ~~the~~ same for food?

○

(2) How does milk help build

calcium? If we put them in milk how would it differ?

○ Real world connection: Explain how these results show the impact of calcium loss in bones. How does this experiment reflect what happens in osteoporosis?

These results lessen the calcium levels in the bones making them weaker and easier to break. This experiment ~~fe~~ reflects what happens because it shows how a bone with low calcium levels react.

T. Andra Stone

Period: 2

SCIENCE NOTEBOOK RUBRIC

<p>ance 5)</p>	<p>Excellent 4 pts</p>	<p>Proficient/Good 3 pts</p>	<p>Developing 2 pts</p>	<p>Needs Revision 1 pt</p>
<p>zation 5)</p>	<p><input checked="" type="checkbox"/> The notebook divided into the respective subsections. <input checked="" type="checkbox"/> Relevant information such as student name, date and signature present on first page <input checked="" type="checkbox"/> well written, organized and neat. <input checked="" type="checkbox"/> contains all required elements: title, hypothesis, materials, etc.</p>	<p>Missing or have not clearly identified one of the following: <input checked="" type="checkbox"/> The notebook divided into the respective subsections. <input checked="" type="checkbox"/> Relevant information such as student name, date and signature present on first page <input checked="" type="checkbox"/> well written, organized and neat. <input checked="" type="checkbox"/> contains all required elements: title, hypothesis, materials, etc.</p>	<p>Two key elements missing or not clearly identified: <input checked="" type="checkbox"/> The notebook divided into the respective subsections. <input checked="" type="checkbox"/> Relevant information such as student name, date and signature present on first page <input checked="" type="checkbox"/> well written, organized and neat. <input checked="" type="checkbox"/> contains all required elements: title, hypothesis, materials, etc.</p>	<p>More than two key elements missing/not clearly identified. <input checked="" type="checkbox"/> The notebook divided into the respective subsections. <input checked="" type="checkbox"/> Relevant information such as student name, date and signature present on first page <input checked="" type="checkbox"/> well written, organized and neat. <input checked="" type="checkbox"/> contains all required elements: title, hypothesis, materials, etc.</p>
<p>cedure 5)</p>	<p>Procedures are: <input checked="" type="checkbox"/> Written in command <input checked="" type="checkbox"/> Written in a list <input checked="" type="checkbox"/> Does not use I, we, you <input checked="" type="checkbox"/> Specific <input checked="" type="checkbox"/> Refer to glassware and instruments used <input checked="" type="checkbox"/> Includes any measurements</p>	<p>Procedures are missing one of the following: <input checked="" type="checkbox"/> Written in command <input checked="" type="checkbox"/> Written in a list <input checked="" type="checkbox"/> Does not use I, we, you <input checked="" type="checkbox"/> Specific <input checked="" type="checkbox"/> Refer to glassware and instruments used <input checked="" type="checkbox"/> Includes any measurements</p>	<p>Procedures are missing two of the following: <input checked="" type="checkbox"/> Written in command <input checked="" type="checkbox"/> Written in a list <input checked="" type="checkbox"/> Does not I, we, you <input checked="" type="checkbox"/> Specific <input checked="" type="checkbox"/> Refer to glassware and instruments used <input checked="" type="checkbox"/> Includes any measurements</p>	<p>Procedures are: Copied from the handout OR MISSING more than two: <input checked="" type="checkbox"/> Written in command <input checked="" type="checkbox"/> Written in a list <input checked="" type="checkbox"/> Does not use I, we, you <input checked="" type="checkbox"/> Specific <input checked="" type="checkbox"/> Refer to glassware and instruments used <input checked="" type="checkbox"/> Includes measurements</p>
<p>ations ta & ations 5)</p>	<p><input checked="" type="checkbox"/> Observations are plentiful and specific for each experiment <input checked="" type="checkbox"/> Charts and graphs are recorded where necessary <input checked="" type="checkbox"/> Data is properly recorded in a coherent table Proper calculations are carried out. Proper units are used.</p>	<p>Missing one of the following: <input checked="" type="checkbox"/> Observations are plentiful and specific for each experiment <input checked="" type="checkbox"/> Charts and graphs are recorded where necessary. <input checked="" type="checkbox"/> Data is properly recorded in a coherent table Proper calculations are carried out. Proper units are used</p>	<p>Missing two of the following: <input checked="" type="checkbox"/> Observations are plentiful and specific for each experiment <input checked="" type="checkbox"/> Charts and graphs are recorded where necessary. <input checked="" type="checkbox"/> Data is properly recorded in a coherent table Proper calculations are carried out. Proper units are used</p>	<p>No data table present. Observations are vague and unclear. Calculations unclear or incorrect.</p>

Period:

<p>mission (4)</p>	<p><input type="checkbox"/> All questions are answered thoroughly</p> <p><input type="checkbox"/> Answers to all questions are correct</p>	<p><input type="checkbox"/> Most questions are answered thoroughly</p> <p><input type="checkbox"/> Most answers to questions are correct</p>	<p><input type="checkbox"/> Some questions are answered thoroughly</p> <p><input type="checkbox"/> Some answers to questions are correct</p>	<p><input type="checkbox"/> Most answers are missing.</p> <p><input type="checkbox"/> Most answers are incorrect</p>
<p>usion (Lab) (5)</p>	<p><input type="checkbox"/> Restates hypothesis is incorrect/correct</p> <p><input type="checkbox"/> States hypothesis is analyzed thoroughly and correctly. It's used to support valid conclusions</p> <p><input type="checkbox"/> Data is analyzed thoroughly and correctly. It's used to support valid conclusions</p> <p><input type="checkbox"/> 2 Sources of error in experiment explained</p> <p><input type="checkbox"/> 2 ways to improve the experiment is explained</p> <p><input type="checkbox"/> Asks a new question</p> <p><input type="checkbox"/> Makes a connection to how experiment could be used in real life.</p>	<p><input type="checkbox"/> One key element of conclusion is missing or not fully expanded upon (i.e. evidence, sources of error, etc.):</p> <p><input type="checkbox"/> Restates hypothesis</p> <p><input type="checkbox"/> States hypothesis is incorrect/correct</p> <p><input type="checkbox"/> Data is analyzed thoroughly and correctly. It's used to support valid conclusions</p> <p><input type="checkbox"/> 2 Sources of error in experiment explained</p> <p><input type="checkbox"/> 2 ways to improve the experiment is explained</p> <p><input type="checkbox"/> Asks a new question</p> <p><input type="checkbox"/> Makes a connection to how experiment could be used in real life</p>	<p><input type="checkbox"/> Two key elements of conclusion are missing:</p> <p><input type="checkbox"/> Restates hypothesis</p> <p><input type="checkbox"/> States hypothesis is incorrect/correct</p> <p><input type="checkbox"/> Data is analyzed thoroughly and correctly. It's used to support valid conclusions</p> <p><input type="checkbox"/> 2 Sources of error in experiment explained</p> <p><input type="checkbox"/> 2 ways to improve the experiment is explained</p> <p><input type="checkbox"/> Asks a new question</p> <p><input type="checkbox"/> Makes a connection to how experiment could be used in real life</p>	<p><input type="checkbox"/> Paraphrases manual with little data analysis</p> <p><input type="checkbox"/> Conclusions may be wrong or data misinterpreted.</p> <p><input type="checkbox"/> More than two key elements missing from conclusion.</p>
<p>illing lines/ onism (5)</p>	<p><input type="checkbox"/> Handed in on time</p>	<p><input type="checkbox"/> Handed in one day late</p>	<p><input type="checkbox"/> Handed in two days late</p>	<p><input type="checkbox"/> Handed in more than three days late</p>
<p>Total Score (/100 pts):</p>				