

Acid Rain & Historic Homes

What is Acid Rain?

Acid rain is precipitation with a pH (acidity level) of 5.2 or below – this primarily caused by the sulfur dioxide and nitrogen oxides from human activities like the combustion of fossil fuels (like coal and oil). Acid rain can make surface waters (like ponds and lakes) more acidic, weaken trees, and depletes soil of important nutrients that plants need to grow¹.

How does it affect historic homes?

Acid rain can contribute to the corrosion and deterioration of surfaces that are exposed to the elements like buildings and monuments (particularly those made of limestone and marble)². The most affected building materials include: carbon-steel, zinc, nickel, paint and plastic³. Stone is affected but it takes much longer – first signs of deterioration is loss of detail on hand carved facets⁴.

Castle in the Clouds – there is little that we can do to prevent the effects of acid rain on the historic Lucknow Mansion or our surrounding landscape. We work with the understanding that we will have to replace materials at the end of their lives and we work diligently to minimize other man-made deterioration.

¹ <https://www.britannica.com/science/acid-rain/Chemistry-of-acid-deposition>

² <https://www.britannica.com/science/acid-rain/Chemistry-of-acid-deposition>

³ <http://www.air-quality.org.uk/12.php>

⁴ <http://www.air-quality.org.uk/12.php>

Activity

DISCLAIMERS: YOU SHOULD NOT TASTE THE “ACID RAIN” EVEN THOUGH IT’S VINEGAR.

MATERIALS:

- 1 c. Vinegar (acts as our acid in this experiment)
- 1 c. distilled water
- 2 medium sized egg shells
- 2 small green leaves
- 2 paperclips
- 2 small rocks
- 2 small or medium sized jars (any clear container with a secure lid)
- Masking tape and a pen to label

PROCEDURE:

1. GATHER YOUR MATERIALS
2. MAKE YOUR PREDICTION OR HYPOTHESIS ABOUT: IF VINEGAR CONTAINS ACID (ACETIC ACID), THEN HOW WILL THE ITEMS PLACED IN VINEGAR CHANGE? IF THESE ITEMS ARE PLACED IN WATER, WILL THEY CHANGE IN THE SAME WAYS AS IN THE VINEGAR?

MY HYPOTHESIS IS...

3. USING THE MASKING TAPE AND PEN, LABEL ONE JAR “VINEGAR” AND THE OTHER JAR “WATER”
4. POUR 1 C. VINEGAR INTO THE “VINEGAR” JAR.
5. PLACE 1 LEAF, 1 PAPERCLIP, 1 EGG SHELL AND 1 SMALL ROCK INTO THE VINEGAR JAR AND PUT THE LID ON THE CONTAINER
6. POUR 1 C. WATER INTO THE “WATER” JAR
7. PLACE 1 LEAF, 1 PAPERCLIP, 1 EGG SHELL AND 1 SMALL ROCK INTO THE WATER AND PUT THE LID ON THE CONTAINER
8. SET BOTH JARS ON A WINDOWSILL OR SECURE PLACE TO BE STORED OVERNIGHT
9. NEXT DAY* REMOVE THE LIDS FROM BOTH JARS AND OBSERVE ANY CONDITIONS OF THE ITEMS IN THE JARS:

DAY:2 WATER JAR

VINEGAR JAR

PAPER CLIP: _____

PAPERCLIP: _____

LEAF: _____

LEAF: _____

EGGSHELL: _____

EGGSHELL: _____



10. PUT THE LID BACK ON THE JARS AND RETURN THEM TO THEIR STORAGE SPOT – CHECK BACK ON THE ITEMS AS FREQUENTLY AS YOU WISH OVER THE NEXT WEEK AND NOTE YOUR OBSERVATIONS.

DAY: ___ WATER JAR

VINEGAR JAR

PAPER CLIP: _____

PAPERCLIP: _____

LEAF: _____

LEAF: _____

EGGSHELL: _____

EGGSHELL: _____

11. REVIEWING YOUR NOTES ON THE CHANGES TO THE ITEMS – WHAT IS YOUR CONCLUSION ABOUT HOW ACID AFFECTS ITEMS? DOES IT MATCH YOUR HYPOTHESIS?

* CHANGES MAY NOT BE VISIBLE IN THE FIRST 24-48 HOURS