

## **Claim, Evidence, Reasoning Activities**

### **Synopsis**

- Students learn about the general properties of acids and bases through a mini-lecture
- Students use acid-base indicators with known acids and bases to reinforce information provided in the lecture
- Students are given 2 unknowns that they must identify as an acid or a base using their lecture notes and laboratory tests
- Students must present their findings in the Claim, Evidence, Reasoning format
- Students listen to a 60-Second Scientific American Podcast as a class and identify the Claim, Evidence and Reasoning statements
- Students choose 3 more 60-Second Scientific American Podcasts and identify the Claim, Evidence and Reasoning Statements in each on their own

## Lab

### CLAIM, EVIDENCE, REASONING

Use this process to help you write hypotheses and complete your lab reports.

#### Bigfoot and Littlefoot

Study the following drawing.



CLAIM-What do you think is happening in this illustration?

EVIDENCE-What made you come up with the claim you wrote above?

REASONING-Put the CLAIM and Evidence together in one statement.

## CLAIM, EVIDENCE, REASONING

### Acids And Bases

#### Background Information

##### *Acids*

Taste sour

Turn litmus paper red

Produce H<sup>+</sup>

Corrosive

##### *Bases*

Taste bitter

Have no effect on litmus paper

Slippery

Produce OH<sup>-</sup>

Corrosive

##### *pH scale-*

0-14

Acids-below 7

Bases –above 7

Neutral=7

##### *Indicators-*

Change color in the presence of H<sup>+</sup> or OH<sup>-</sup>

Will indicate the presence of an acid or base

##### Tests I

Vinegar is an acid. Test a sample of vinegar with litmus paper and pH paper.

Vinegar turns litmus paper \_\_\_\_\_ and has a pH of \_\_\_\_\_.

According to the information above and the litmus and pH paper tests, it is confirmed that vinegar is an acid.

Ammonia is a base. Test a sample of ammonia with litmus paper and pH paper.

Ammonia turns litmus paper \_\_\_\_\_ and has a pH of \_\_\_\_\_.

According to the information above and the litmus and pH paper tests, it is confirmed that ammonia is a base.

##### *Purple Cabbage Indicator-*

When tested with a known acid (vinegar), purple cabbage indicator turns

\_\_\_\_\_

When tested with a known base (ammonia), purple cabbage indicator turns

\_\_\_\_\_

Use what you've learned to answer the following questions:  
Is HCl an acid or a base?  
Is NaOH an acid or a base?

Tests III

HCl turns litmus paper \_\_\_\_\_  
NaOH turns litmus paper \_\_\_\_\_

HCl turns purple cabbage indicator \_\_\_\_\_  
NaOH turns purple cabbage indicator \_\_\_\_\_

When tested with pH paper, HCl has a pH of \_\_\_\_\_  
When tested with pH paper, NaOH has a pH of \_\_\_\_\_

Claim:

State what you think you know about HCl and NaOH.

Evidence:

State the evidence you observed.

Reasoning:

Put your claim and evidence statements together.

**Answer:****Claim**

HCl is an acid and NaOH is a base.

**Evidence**

HCl turned purple cabbage indicator pink, litmus paper red and according to the pH paper has a pH of 1.

NaOH turned purple cabbage indicator green and according to the pH paper has a pH of 12.

**Reasoning**

Simple

HCl is an acid because it turns litmus paper red, purple cabbage indicator pink and has a pH of 1.

NaOH is a base because it does not affect litmus paper, turns purple cabbage indicator green and has a pH of 12.

Better

Acids turn litmus paper red, purple cabbage indicator pink and have a pH of below 7. HCl turned litmus paper red, purple cabbage indicator pink and has a pH of 1, therefore, it is an acid.

Bases have no effect on litmus paper, turn purple cabbage indicator green and have a pH of above 7. NaOH had no effect on litmus paper, turned purple cabbage indicator green and has a pH of 12, therefore, it is a base.

Extension:

Do you think HBr an acid or a base?

Do you think  $\text{Ca}(\text{OH})_2$  an acid or a base?

Explain your answers.

How could you determine if HBr and  $\text{Ca}(\text{OH})_2$  are acids or bases?

**Podcast:**

Listen to the podcast : *Scientific American 60 Second Science- Pirates Needed Science Too* and develop a claim, provide evidence and state your reasoning based on what you hear.

Claim:

Evidence:

Reasoning:

**Assignment:**

Choose 2 more Scientific American 60 Second Science Podcasts and develop a claim, provide evidence and state your reasoning based on what you hear.

Podcast 1

Title: \_\_\_\_\_

Claim:

Evidence:

Reasoning:

Podcast 2

Title: \_\_\_\_\_

Claim:

Evidence:

Reasoning: