

University of New Hampshire

University of New Hampshire Scholars' Repository

Day 22 Apr 14 Intern: Chemical reactions and energy

Fire and Ice

1-1-2016

22.0.A Daily Outline

Christopher F. Bauer

University of New Hampshire, chris.bauer@unh.edu

Follow this and additional works at: <https://scholars.unh.edu/day22>

Recommended Citation

Bauer, Christopher F., "22.0.A Daily Outline" (2016). *Day 22 Apr 14 Intern: Chemical reactions and energy*.

1.

<https://scholars.unh.edu/day22/1>

This Report is brought to you for free and open access by the Fire and Ice at University of New Hampshire Scholars' Repository. It has been accepted for inclusion in Day 22 Apr 14 Intern: Chemical reactions and energy by an authorized administrator of University of New Hampshire Scholars' Repository. For more information, please contact Scholarly.Communication@unh.edu.

Activity Table 1:

PART 1

You see in front of you **vinegar** and **baking soda**. You will be required to explore what happens (focus on heat here) when these two are combined. Many of you have built “volcanoes” out of this reaction but you may find it interesting to discover what this “volcanic” reaction has to do with heat.

Hold a thermometer in a cup

As a preliminary exploration, mix the two together in that cup.

Write down observations (BE SURE TO RECORD INITIAL AND FINAL TEMPERATURES)

Answer exploration questions Part 1

Exploration questions Part 1

1. What is different about this exploration of heat as compared with other explorations of heat we've done in the past?
2. Describe what you're seeing and begin proposing preliminary explanations. Write down your explanations in your recorder report. You may wish to think about this on the molecular level.

PART 2

Now we need to explore this a little bit further. What do you think will happen when you change the amounts of the substances being mixed together?

Mix together three different quantities of the substances you have.

First keep the vinegar constant and add three varying amounts of baking soda.

Then keep the baking soda constant and vary the amount of vinegar you add.

Here's a suggested ratio

Experiment 1, 10 mL of vinegar with 1, 2 and 3 scoops of the baking soda.

Experiment 2, 2 scoops of the baking soda with 5, 10, and 15 mL of vinegar.

Record data, observations etc.

Exploration questions Part 2

1. Does this experiment add to your understanding of what is going on in relation to heat? If not, why? If so, how?
2. Comment on the question, “Where is the heat going or where is it coming from?”

At this time, please put together a poster presentation to display your findings. The spokesperson should get ready to present a 2-3 minute long presentation.

Activity Table 2:

PART 1

You see in front of you **calcium chloride (CaCl_2)** and a mixture of **baking soda and water**. You will be required to explore what happens (focus on heat here) when these two are combined. You may never have interacted with some of these chemicals before (knowingly) and it will be important to carefully record your observations.

- ✓ Hold a thermometer in a cup
- ✓ As a preliminary exploration, mix the two together in that cup.

1 scoop of the CaCl_2 and about 10 mL of the baking soda solution

- ✓ Write down observations (BE SURE TO RECORD INITIAL AND FINAL TEMPERATURES)

Answer exploration questions Part 1

Exploration questions Part 1

- ✓ 1. What is different about this exploration of heat as compared with other explorations of heat we've done in the past?
- ✓ 2. Describe what you're seeing and begin proposing preliminary explanations. Write down your explanations in your recorder report. You may wish to think about this on the molecular level.

PART 2

Now we need to explore this a little bit further. What do you think will happen when you change the amounts of the substances being mixed together?

Mix together three different quantities of the substances you have.

First keep the baking soda constant and add three varying amounts of CaCl_2 .

Then keep the CaCl_2 constant and vary the amount of baking soda you add.

Here's a suggested ratio

Experiment 1, 10 mL of vinegar with 1, 2 and 3 scoops of the CaCl_2 .

Experiment 2, 2 scoops of the CaCl_2 with 5, 10, and 15 mL of baking soda.

Record data, observations etc.

Exploration questions Part 2

1. Does this experiment add to your understanding of what is going on in relation to heat? If not, why? If so, how?
2. Comment on the question, "Where is the heat going or where is it coming from?"

At this time, please put together a poster presentation to display your findings. The spokesperson should get ready to present a 2-3 minute long presentation.

*endo-heat goes in
exothermic - heat leaves
process*

Activity Table 3:

PART 1

You see in front of you **steel wool**, and **vinegar**. You will be required to conduct an experiment mixing steel wool (which contains mostly iron) and air. The steel wool is coated in a coating that keeps it protected from the air. We'll use the vinegar to wash off that coating and explore what happens in relation to heat. It will be important to carefully record your observations.

Hold a thermometer in an Erlenmeyer flask.

Dip the steel wool into the vinegar for about 10 seconds.

Remove and quickly pat dry

Quickly place the steel wool into the Erlenmeyer flask and cover the top with foil or parafilm (see instructor for assistance if needed).

Write down observations (BE SURE TO RECORD INITIAL AND FINAL TEMPERATURES)

Answer exploration questions Part 1

Exploration questions Part 1

1. What is different about this exploration of heat as compared with other explorations of heat we've done in the past?
2. Describe what you're seeing and begin proposing preliminary explanations. Write down your explanations in your recorder report. You may wish to think about this on the molecular level.

PART 2

Now we need to explore this a little bit further. What do you think will happen when you change the amounts of the substances being mixed together?

For this next experiment, do the same as above except use increasing amounts of steel wool

You may use the kitchen balance to do this.

Record data, observations etc.

Exploration questions Part 2

1. Does this experiment add to your understanding of what is going on in relation to heat? If not, why? If so, how?
2. Comment on the question, "Where is the heat going or where is it coming from?"

At this time, please put together a poster presentation to display your findings. The spokesperson should get ready to present a 2-3 minute long presentation.

Activity Table 4:

PART 1

You see in front of you **ammonium chloride** and **water**. You will be required to conduct an experiment mixing the ammonium chloride with the water to explore what happens in relation to heat. It will be important to carefully record your observations.

Hold a thermometer in a cup.

Add enough water to fill to the line or about halfway.

Add a leveled scoop of the ammonium chloride.

Write down observations (BE SURE TO RECORD INITIAL AND FINAL TEMPERATURES)

Answer exploration questions Part 1

Exploration questions Part 1

1. What is different about this exploration of heat as compared with other explorations of heat we've done in the past?
2. Describe what you're seeing and begin proposing preliminary explanations. Write down your explanations in your recorder report. You may wish to think about this on the molecular level.

PART 2

Now we need to explore this a little bit further. What do you think will happen when you change the amounts of the substances being mixed together?

Mix together three different quantities of the substances you have.

Keep the amount of water constant and add three varying amounts of ammonium chloride.

Here's a suggested ratio

Experiment 1, 50 mL of water with 1, 2 and 3 scoops of the ammonium chloride.

Record data, observations etc.

Exploration questions Part 2

1. Does this experiment add to your understanding of what is going on in relation to heat? If not, why? If so, how?
2. Where is the heat going or where is it coming from?

At this time, please put together a poster presentation to display your findings. The spokesperson should get ready to present a 2-3 minute long presentation.

Activity Table 5:

PART 1

You see in front of you **batteries**, **electrical tape**, and some **wire**. Did you know that what happens in a battery to give us energy is actually a chemical reaction? You will be required to explore this concept by measuring heat with an IR gun as batteries do their thing. It will be important to carefully record your observations.

Build a circuit (yes a shorted circuit) using the materials you have being careful not to create a circuit with your body.

Use the IR gun to measure the temperature of the wire.

Write down observations (BE SURE TO RECORD INITIAL AND FINAL TEMPERATURES)

Answer exploration questions Part 1

Exploration questions Part 1

1. What is different about this exploration of heat as compared with other explorations of heat we've done in the past?
2. Describe what you're seeing and begin proposing preliminary explanations. Write down your explanations in your recorder report. You may wish to think about this on the molecular level.

PART 2

Now we need to explore this a little bit further. What do you think will happen when you change the amounts of the substances being mixed together?

Put 2, then 3 batteries in series and observe as you did above.

Record data, observations etc.

Exploration questions Part 2

1. Does this experiment add to your understanding of what is going on in relation to heat? If not, why? If so, how?
2. Where is the heat going or where is it coming from?

At this time, please put together a poster presentation to display your findings. The spokesperson should get ready to present a 2-3 minute long presentation.

Activity Table 6:

PART 1

You see in front of you household **hydrogen peroxide** and **baking soda**. You will be required to explore what happens (focus on heat here) when these two are combined.

Hold a thermometer in a cup

As a preliminary exploration, mix the two together in that cup.

Write down observations (BE SURE TO RECORD INITIAL AND FINAL TEMPERATURES)

Answer exploration questions Part 1

Exploration questions Part 1

1. What is different about this exploration of heat as compared with other explorations of heat we've done in the past?
2. Describe what you're seeing and begin proposing preliminary explanations. Write down your explanations in your recorder report. You may wish to think about this on the molecular level.

PART 2

Now we need to explore this a little bit further. What do you think will happen when you change the amounts of the substances being mixed together?

Mix together three different quantities of the substances you have.

First keep the hydrogen peroxide constant and add three varying amounts of baking soda.

Then keep the baking soda constant and vary the amount of vinegar you add.

Here's a suggested ratio

Experiment 1, 10 mL of hydrogen peroxide with 1, 2 and 3 scoops of the baking soda.

Experiment 2, 2 scoops of the baking soda with 5, 10, and 15 mL of hydrogen peroxide.

Record data, observations etc.

Exploration questions Part 2

1. Does this experiment add to your understanding of what is going on in relation to heat? If not, why? If so, how?
2. Comment on the question, "Where is the heat going or where is it coming from?"

At this time, please put together a poster presentation to display your findings. The spokesperson should get ready to present a 2-3 minute long presentation.

Activity Table 7:

PART 1

You see in front of you two solids, **barium hydroxide** and **ammonium nitrate**. You will be required to explore what happens (focus on heat here) when these two are combined.

Hold a thermometer in an Erlenmeyer flask.

Add the barium hydroxide to the flask.

Add the ammonium nitrate to the flask (note the ammonium will kind of stink).

Stir with the thermometer.

Write down observations (**BE SURE TO RECORD INITIAL AND FINAL TEMPERATURES**)

Answer exploration questions Part 1

Exploration questions Part 1

1. What is different about this exploration of heat as compared with other explorations of heat we've done in the past?
2. Describe what you're seeing and begin proposing preliminary explanations. Write down your explanations in your recorder report. You may wish to think about this on the molecular level.

PART 2

Now we need to explore this a little bit further. What do you think will happen when you change the amounts of the substances being mixed together?

Mix together three different quantities of the substances you have.

First keep the hydrogen peroxide constant and add three varying amounts of baking soda.

Then keep the baking soda constant and vary the amount of vinegar you add.

Here's a suggested ratio

Experiment 1, 2 scoops of the ammonium nitrate with 1, and 2 scoops of the barium hydroxide.

Experiment 2, 2 scoops of the barium hydroxide with 1, and 2 scoops of ammonium nitrate.

Record data, observations etc.

Exploration questions Part 2

1. Does this experiment add to your understanding of what is going on in relation to heat? If not, why? If so, how?
2. Comment on the question, "Where is the heat going or where is it coming from?"

At this time, please put together a poster presentation to display your findings. The spokesperson should get ready to present a 2-3 minute long presentation.