

Name:

Period:

LAB 19: THE ENERGY OF COVALENT VS. IONIC BONDS

BACKGROUND

We have read that ionic bonds are very strong compared to covalent bonds. This has to do with a couple of factors:

- ionic bonds are formed by transferred electrons, not shared electrons
- ionic bonds create positive and negative ions which are then attracted to each other
- ionic bonds form a crystalline matrix (all positive ions attract all the negative ions around it, and all negative ions attract the positive ions around it).

Today we will work with two white “crystals.” Only one is actually a crystal; the other is composed of a covalently bonded molecule artificially made into a crystallized form. Our test will be to apply heat to the substances.

PROBLEM

How can we identify an ionic bond vs. a covalent bond using heat?

HYPOTHESIS

MATERIALS

- ◆ plastic spot plate
- ◆ watch glass
- ◆ triple-beam balance
- ◆ scoop
- ◆ candle & clay candle holder
- ◆ two test tubes
- ◆ test tube clamp
- ◆ test tube rack
- ◆ test tube brush
- ◆ two white substances (labeled A & B)
- ◆ apron and safety glasses

SAFETY WARNING – All hair longer than shoulder length must be tied back. Do not eat or taste any substance (don't assume that it is safe, even if you think you know what the substances are, they might have gotten mixed up with other, unsafe substances).

PROCEDURE

1. Fill a well of the spot plate about $\frac{1}{2}$ way with substance one of the substances (A or B).
2. Use the watch glass and balance to measure out 1 gram of the substance.
3. Place the substance in a test tube and place the tube in the rack.
4. Set up the candle in the candle holder and light the candle.



5. Read this entire step first before carrying it out. Use the test tube clamp to hold the test tube over the flame. Keep the tube just above the flame's tip, not so close that the tube scorches, but not too far away. **Be sure to point the test tube away from your face.**
6. Heat the substance until you see a reaction inside the test tube (or until 3 minutes have elapsed). Observe your results and record your observations in the data section.
7. When you are finished, place the test tube back in the rack.
8. Dump the remaining substance down the drain. If your spot plate gets wet, **be sure to dry it off thoroughly.**
9. Using a new test tube, repeat steps 1 – 7, this time using the other substance.



10. When you have finished with both test tubes, carefully clean them out using the test tube brush and warm, soapy water. Then place them *upside down* in the test tube rack. If the tube will not come clean, fill it half-way with soapy water and leave it in the rack (right side up).
11. All remaining substances can be washed down the drain.
12. Clean and dry your lab station.

DATA

Table 19-1: Observations & illustrations of heated substances

Substance A	Substance B

SUMMARY AND CHALLENGE QUESTIONS
MUST BE TYPED OR NEATLY HAND WRITTEN

SUMMARY

1. What happened to substance A when it was heated over a candle flame?
2. What happened to substance B when it was heated over a candle flame?
3. How does this give us evidence about which of the two substances was created from a molecule with an ionic bond?

CHALLENGE

1. Look through your notes, the reading, and your lab results. Create a Venn diagram that compares and contrasts ionic and covalent bonds.

