

Experiment 1.

Percent Water in a Hydrated Salt

**Experimental
Procedure**

Lab 402, 406, & 704

A. Sample Preparation

1. Prepare a clean crucible

Support the crucible and lid on a clay triangle and heat with an intense flame for 5 minutes.

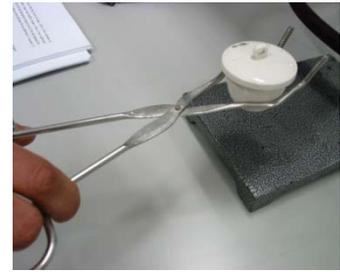
Allow them to cool slowly. (**Caution:** *Do not set them on the lab bench for fear of contamination. Hot and cool crucibles look the same-do not touch!*)

Determine the mass (± 0.001 g) of the fired, cool crucible and lid and record.

Clay triangle

Bunsen burner





Iron ring



Clay triangle

Bunsen burner





On heating, the lid should be tilted slightly.



After heating, use a laboratory tong to handle the crucible and lid.
In cooling the crucible and the lid, place them on the triangle or a CERAN Plate
provided by TA , **NOT a lab bench.**
(CERAN, Safety Ceramic Glass Plate)

Do not weigh hot or warm objects. Object should be at room temperature.



You MUST Close the lid in cooling !!



2. Determine the mass of sample

Add no more than 2.5 g of your hydrated salt to the crucible.

Measure and record the combined mass (± 0.001 g) of the crucible, lid, and hydrated salt.

Calculate the mass of the hydrated salt.

Clay triangle

3. Adjust the crucible lid

Return the crucible (use crucible tongs only) with the sample to the clay triangle; set the lid just off the lip of the crucible to allow the evolved water molecules to escape on heating (The lid should be tilted slightly).



B. Thermal Decomposition of the Sample

1. Heat the sample

Initially, heat the sample slowly and then gradually intensify the heat. Do not allow the crucible to become red hot.

Maintain the high temperature on the sample for 10 minutes.

Cover the crucible with the lid; allow both to cool to room temperature.

Determine the combined mass of the crucible, lid, and anhydrous salt **on the same balance that was use for earlier measurement.**





2. Have you removed all of the water?

Preheat the sample for 2 minutes but do not intensify the flame-avoid decomposing the salt. Cool to room temperature and again measure the combined mass.

If this second mass measurement of the anhydrous salt disagrees by greater than ± 0.001 g from that in **PART B.1**, repeat **PART B.2**.

Bunsen burner



CLEANUP:

Rinse the crucible with 2-3 milliliters of 1 M HCl and discard in the Waste Acids container in the lab chemical hood. Then several times with tap water and finally distilled water.

Clay triangle

DISPOSAL:

Dispose of waste anhydrous salt in the Waste Solids container in the chemical hood.

Bunsen burner



Using Bunsen Burner

The Bunsen burner is used in laboratories to heat things. In order to use it safely and appropriately, it is important to know the correct steps on how to set it up and operate it. A Bunsen burner can produce 3 different types of flames:

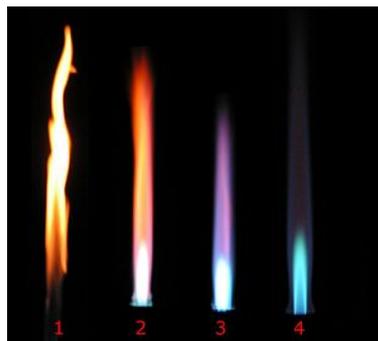
The "coolest" flame is a yellow / orange color. It is approximately 300°C. It is never used to heat anything, only to show that the Bunsen burner is on. It is called the **safety flame**. (1)

The medium flame, also called the **blue flame** or the invisible flame is difficult to see in a well-lit room.

It is the most commonly used flame. It is approximately 500°C. (3)

The hottest flame is called the **roaring blue flame**.

It is characterized by a light blue triangle in the middle and it is the only flame of the 4 which makes a noise. It is approximately 700°C. (4)



Different flame types of Bunsen burner depending on flow through the throat holes (holes on the side of the Bunsen burner -- not to be confused with the needle valve for gas flow adjustment). 1. air hole closed (Safety flame) 2. air hole slightly open 3. air hole half open 4. air hole almost open (roaring blue flame)

STEP 1 The first step is to **check for safety** – lab coat on, long hair tied back, safety glasses on, books and papers away from the flame, apparatus set up not too close to the edge of the table...

STEP 2 Adjust the collar so that the air intake openings are half open or fully open.

STEP 3 **Light the Bunsen burner.** To turn it on, you must first push down, then turn the tap. To light the burner with a striker, you must produce a spark at the same time you open the gas valve.

STEP 4 **Adjust the flame by turning the collar and stopcock** so that you have the appropriate flame for the experiment. Adjust the collar so that the flame is blue and a pale blue inner cone is visible. The most efficient and hottest flame is blue in color.

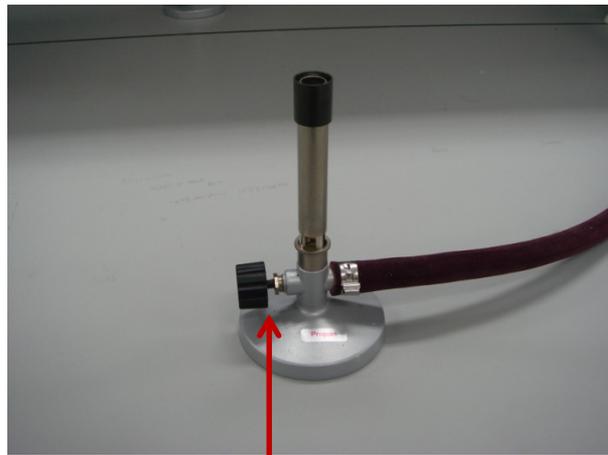
STEP 5 During the experiment, **stay vigilant** so that if a problem occurs, you are ready to turn off the flame quickly. This means that you should not leave your table unattended.



Gas tap closed



Gas tap open



Stopcock (gas control)



Collar (air control)



Using Bunsen Burners Safely

- Remove all flammable and combustible materials from the lab bench and surrounding work area when Bunsen burners will be used. Do NOT use a Bunsen burner in any lab when working with flammable liquids or solvents.
- Review the basic construction of a Bunsen burner and inspect the burner, attached tubing, and gas valve before use. Check for holes or cracks in the tubing and replace the tubing if necessary.
- Use only heat-resistant, borosilicate glassware when using a Bunsen burner. Check the glassware for scratches, nicks or cracks before use and discard defective glassware—cracked glassware may shatter without warning when heated.
- Wear chemical-splash goggles whenever working with chemicals, heat or glassware in the science lab. Tie back long hair when working with a Bunsen burner, and do not wear loose, long-sleeved clothing. Never reach over an exposed flame!



- Instruct students in the proper procedure for lighting a Bunsen burner. Close or partially close the air vents on the burner to make it easier to light. Turn on the gas and bring a lighted match or lighter alongside the barrel of the burner, then slowly raise the flame over the top of the burner from the side.
- Adjust the air supply to obtain a small, bright blue, cone-shaped flame. For slow, uniform heating, brush the burner flame across the bottom of glassware or rotate a test tube in the flame when starting to heat
- Never leave a lit burner unattended. Always turn off the gas at the gas source when finished using a Bunsen burner.
- To reduce heat stress, allow hot glassware or equipment to cool slowly before moving or removing the object. Remember that hot objects remain HOT for a very long time—use tongs and handle with care!



Balance Policies

Analytical balances, especially the four or five place, digital or substitution balances, are capable of measuring the weight of an object to 0.0001 or even 0.00001 grams-, -i.e. (0.1 mg or 0.01 mg). These balances if properly calibrated and maintained are possibly the most accurate and precise measuring instrument found in any laboratory.

Hence, it is imperative that our shared analytical balances be kept in excellent operating condition. I should be noted that each balance is checked daily by a member of the teaching staff for its proper operation and general cleanliness.

It is absolutely imperative that each student needs to first hear "Introductory Balance Talk" and do the introductory about five minute weighing experiment conducted by a qualified teaching assistant. Then each student needs to adhere to the rules that are given below.



General Rules for the Use of Analytical Balances

1. No one may use a balance without first hearing an "introductory balance talk" given by a teaching assistant.
2. Use only the balance to which you are assigned. This must be done even if the assigned balance is in use by another assignee at this particular time. (Remember it usually takes within 30 seconds to accomplish one weighing or only a matter of a few minutes to complete a series of weighing). Posted near the balance will be a list of those students that have been assigned to use that particular balance for the current semester.
3. If there seems to be a problem with the balance, report it immediately, to the instructor or teaching assistant. Do not use another balance, unless instructed to do so.
4. It is imperative that you keep the balance and the immediate area around the balance clean! Clean-up all chemical spills and excess chemical after each use of the balance. Do not leave old Kimwipes® or crumpled papers on the balance table.
5. When the balances are not in use, the balance should be always turned-off and in the case of the substitution balances the beam arrested, all weights on zero and the doors closed.



Additional Usage Notes



Fast-Release Pipette Pump



Fit pipet up to 25mL Flexible elastic thermoplastic rubber chuck holds pipet snugly for safe, sure use.

- Simply insert pipet into detachable, cone-shaped chuck with light finger pressure
- To fill, grasp pump in palm of hand and rotate knurled wheel with thumb
- To empty rapidly, lightly press thumb on quick-release lever
- To empty gradually, rotate wheel
- Parts disassemble for maintenance



Safety Wide Mouth Wash Bottle



Labeled “**Acetone**” with Red Cap
Use Acetone **ONLY**.



Labeled “**Water**” with Blue Cap
Use Distilled Water **ONLY**.

