



**Dr. Anderson's  
Favorite Uses for Diet Coke**

- 1. Density Experiments**
- 2. Diet Coke + Mentos → Sticky Fun!**

**<http://www.eepybird.com/>**

# **CH204 Experiment 2**

**Dr. Brian Anderson**

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## **Separation and Recovery of the Components of a Mixture**

The background of the slide is a composite image. On the left, there are several test tubes containing liquids of different colors (yellow, orange, and dark brown). On the right, there is a chromatogram showing a single sharp peak on a dark background.

# **Experiment 1 Post-Game Show**

**pipette and burette**

**intensive and extensive properties**

**interpolation**

**determining random experimental error**

**What about gross error and  
systematic error?**



# **Experiment 1 Post-Game Show continued...**

**Another question:  
Isn't there some error in the  
density we determined in Part 2?**

**We going to Jamaica, mon!**

## **Experiment 2 Overview**

**Separate a mixture of salt, sand, and chalk dust based on differences in their physical and chemical properties.**

**Add water to dissolve NaCl.**

**Add acid to dissolve  $\text{CaCO}_3$ .**

**$\text{SiO}_2$  is left behind in the beaker.**

# Physical properties

**Characteristics of a material that do not involve changing the chemical formula of the compound. Examples include:**

**Boiling point**

**Physical state**

**Melting point**

**Particle size**

**Solubility**

**Color**

**Density**

**Shape**

**When a compound changes state (solid, liquid, gas, aqueous), it is still the same compound, so that's a physical change, not a chemical change.**

# **Chemical properties**

**Characteristics of a material that DO require changing the chemical formula of the compound. This means reactivity with another chemical. Examples:**

- **Flammability**
- **Oxidizability (rust/tarnish/corrosion)**
- **Oxidation/reduction in general**
- **A host of other chemical reactions**

**The products of a chemical process are different molecules than the reactants.**

## **In this lab**

**Dissolve NaCl in water and recover NaCl by evaporating water. Is this process physical or chemical?**

**React  $\text{CaCO}_3$  with HCl to form  $\text{CaCl}_2$ , then convert  $\text{CaCl}_2$  to  $\text{CaCO}_3$  by adding  $\text{K}_2\text{CO}_3$ . Physical or chemical?**

**$\text{SiO}_2$  - insoluble in water, and unreactive to HCl. Physical or chemical?**



# **Part 1: Removal of NaCl**

**Steps 3-5, transferring the dissolved NaCl:**

**When you are rinsing the beaker with your squirt bottle, don't use excessive amounts of water because you will have to evaporate it all away later.**

# **Separating the salt**

**Step 4: pour the dissolved NaCl through a funnel lined with filter paper.**

**Not all of the liquid will pour through the funnel - the final mL or so will refuse to drip through.**

## **Part 2:**

**“Tiny Bubbles...!”**



**Add HCl dropwise into the stirring mixture of sand and chalk to dissolve the chalk:**



**Tiny bubbles from the bottom of the beaker = chemical reaction**



**“I can’t decant.”**

**Don’t worry about a few grains of sand.**

**“Remove the beaker from the hot plate and let it cool to room temperature.”**

**Please DO NOT put hot items on the white lab bench surface!**

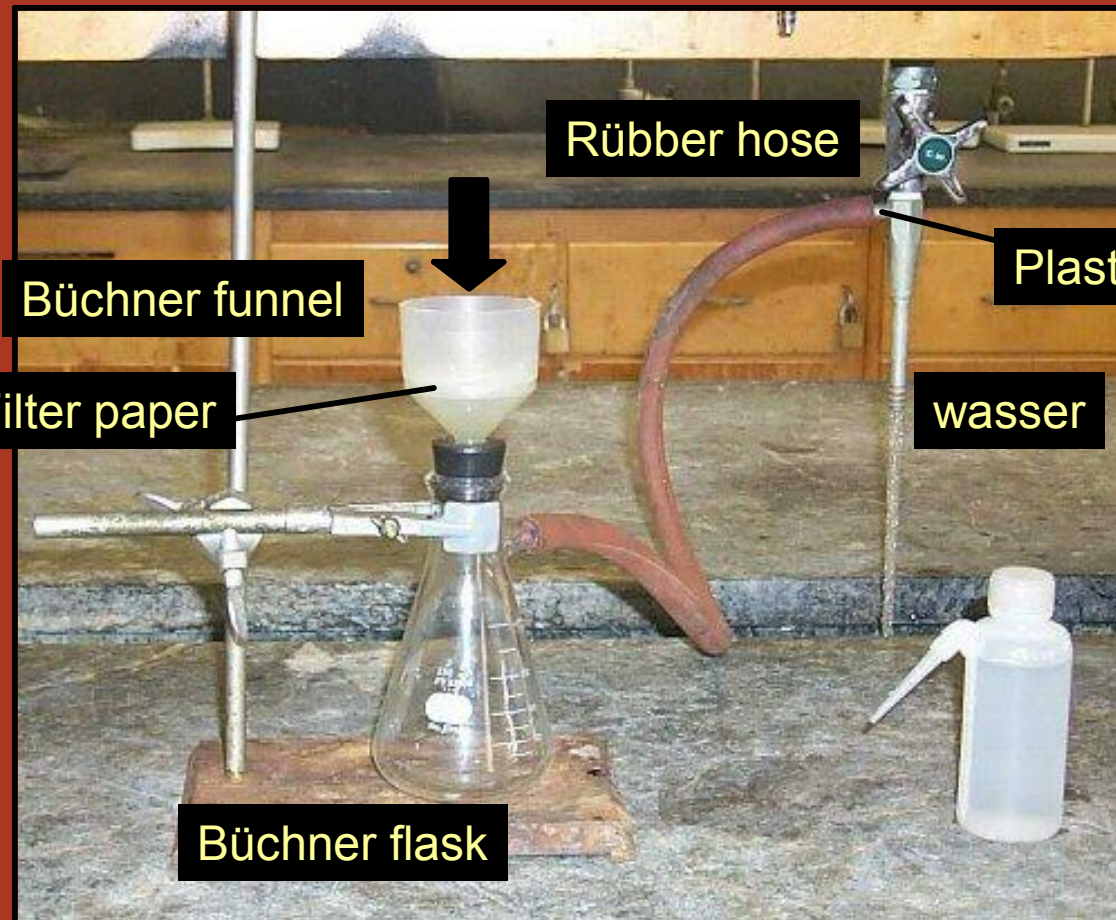


## **Part 3: Recovering the $\text{CaCO}_3$**

**Suction filtering is the trickiest part of the whole experiment.**

**Did he say “Byookner?”**

**Nein, Ich sprach “Büchner.”**



# **Almost finished**

**Biggest source of error - wet  $\text{CaCO}_3$**

**Dry it as best you can in the Büchner funnel, then transfer it to an evaporating dish and dry it on the hot plate.**

**Evaporate  $\text{NaCl}$  slowly in the large evaporating dish. Turn down the heat when the water level gets low.**

**Dry the  $\text{SiO}_2$  in the beaker.**



## **And when you're done...**

**Enter your name into the spreadsheet.**

**Enter your starting mass and the final masses of the recovered NaCl, CaCO<sub>3</sub>, and SiO<sub>2</sub>.**



# **Do you feel lucky?**

**For each component, you have the option of reporting your own data or the average results of everyone who had the same unknown as you.**

**You can Q-Test outlying data points, but you cannot arbitrarily keep or reject data based on hunches, Tarot deck readings, or having “a really bad feeling about this one.”**

# How's that Q-test work again?

Let's go see.

Remember, the Q-test is only used for discarding outliers in replicate analyses. (That means repeat measurements of the same thing.)

# Unknown Summary Sheets

**Some of the experiments we do will require you to identify a chemical unknown in some way :**

- ❖ **Determine the identity of the unknown or**
  - ❖ **Determine its concentration or**
  - ❖ **Determine its composition**

**In addition to your normal lab report, you will turn in an **Unknown Summary Sheet** for these experiments.**

**Unknown Summary Sheets can be found on the small wooden shelves next to the stockroom or can be downloaded from the class web site at**

<http://courses.cm.utexas.edu/banderson/ch204/uss.html>

# Lab write-up

**Don't forget to show a sample calculation for % recovery and for % of each component**

**If you Q-test an outlying data point, show the calculation regardless of whether the point stays or goes.**

## **Post-lab problem 3**

**Directly analogous to our experiment with NaCl, CaCO<sub>3</sub>, and SiO<sub>2</sub>.**

**How would you separate and recover SiO<sub>2</sub> from NaCl and CaCO<sub>3</sub>? Which of the separation and recovery techniques are physical and which are chemical?**



# **Preliminary Write-up for Experiment 3**

**When you copy the reaction tables on  
pages 21 and 22**

**Make them big!**

**You will be writing your  
observations in those tiny  
**boxes.****

# **Final exam time**

**Quizzes make up 30% of your course grade.**

**Nine quizzes, drop the lowest one.**

**Each individual quiz you keep is worth about 3.75% of your final grade.**