

# Chemistry Safety Notes

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"Chemistry Safety Notes" is published by the Chemistry Dept. Safety Committee, written & edited by Debbie Decker, Safety Mgr.

## Spring!

Now that warmer weather has arrived, a chemist's thoughts turn to keeping cool in the lab. Please remember that you must be properly attired in long pants (covered legs) and proper footwear (covered feet) to be in the lab – even if you're working at your desk in the lab. Scrubs are fine.

## Some Tidbits

- **Cruddy containers:** have a critical look at cruddy containers. Should this material be disposed?
- **Lab-made sample management.** please be sure lab-made samples are labeled as such and that the naming scheme is described in the lab documentation.
- **Using the word "waste:"** be very cautious about using the word "waste." Unless it has a hazardous waste label on it, use a different word, rather than "waste." "Spent" is a lovely word.

## Self/Peer Inspections – Done!

Julia and I finished up the self/peer inspections, just before Cal/OSHA arrived. You should have received the inspection report from me for your action.

To close the loop on the inspections, when you have completed your action items, please email me to let me know that you're done.

Overall, no huge compliance gaps were discovered. Continued diligence with labeling is important. And it's always a good idea to remind folks about proper lab attire.

When the new lab safety plan template becomes available (sometime this month, hopefully), I'll be asking you to re-write your lab-specific chemical hygiene plan onto the new template.

## Fire Code Inspections

Fire Code compliance inspections are scheduled for March 25<sup>th</sup> and March 31<sup>st</sup>. In previous years, the focus has been on keeping areas around electrical panels clear, making sure chemicals are stored in compatible groups, and quantities of flammable liquids are kept below the limits. Also, assuring surge protectors are used appropriately and that microwaves, coffee makers, refrigerators and the like are plugged directly into the outlet. In 2013, we had 150 violations. In 2014, we had 75 violations. I anticipate a similar drop in violations this year.



## 6 office yoga moves

### 1 forward bend



### 2 spinal twist



### 3 side stretch



### 4 knee squeeze



### 5 leg lifts



### 6 sun pose



## Cal/OSHA Inspection

On March 3, 2015, we had an inspection from Cal/OSHA, as a part of the settlement agreement. To our advantage, we had a week's notice of the impending inspection. It gave us just enough time to complete our self/peer inspections and to put a little polish on our program.

The opening meeting we had with the Cal/OSHA District Manager and two inspectors included department representatives, EH&S representatives, and representatives from the unions. We described the department processes we have in place to make sure new folks have initial lab safety training and to make sure PIs have SOPs developed for the chemicals they order. Cal/OSHA requested a number of documents which have been provided to them. We were given the opportunity to tell Cal/OSHA which labs work with pyrophorics and water reactive materials. The Berben, David, Kauzlarich, Power, and Shaw labs were in the initial inspection group. Kudos to Bruce Johnson, Amelia Manlove, Julia Zaikina, Michelle Faust, and Gabby Nepomuceno for being available and helpful in facilitating the inspectors.

We haven't received any correspondence from Cal/OSHA, yet, but there were some items they focused on:

- Proper operation of fume hoods, including sash stops;
- Electrical panels – labeling of circuits;
- Chemicals used and stored in labs – SOPs requested in some labs;
- Waste containers;
- Vacuum pump exhaust vented into the lab;
- Flammable liquid storage cabinets;
- Refrigerators (there was a concern expressed about stinky refrigerators);
- Access to Chemical Inventory System;
- Light switch on cold room – should be inside the box and not on the outside of the box;
- Storeroom security.

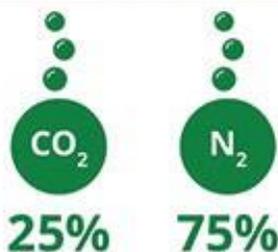
Images were captured of electrical panels, outlets in proximity to sinks, and the inside of cluttered fume hoods and glove boxes. The second inspector took copious notes, including names of chemicals in the lab.

The next inspection will focus on one or two of the labs already visited and will include a document review, staff/lab worker interviews, and review of pyrophoric handling in an actual experiment (depending on the lab chosen, there may be safety considerations around this request). Their goal is to complete this inspection in the next 3 to 6 months.

# THE CHEMISTRY OF GUINNESS

With St. Patrick's Day upon us, we examine some of the chemicals responsible for the color and bitterness of Guinness. And we look at why bubbles in a pint of the famous beer appear to flow downward.

## BUBBLE COMPOSITION



MAKEUP OF THE GAS MIX  
USED TO CARBONATE GUINNESS

Most beer foam is caused by carbon dioxide bubbles, but Guinness also contains bubbles of nitrogen. These lessen the bitter taste to a degree and also make the head of the beer last longer. Nitrogen also reduces the size of the bubbles in the beverage.



## WHY DO THE BUBBLES FALL?



At the center of the glass, the bubbles don't experience the drag they do at the sides, so they rise rapidly.

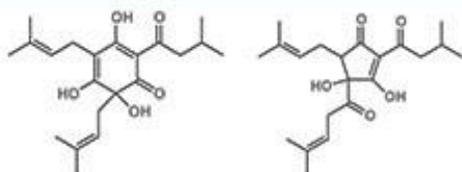


As the bubbles at the center rise, they pull the liquid with them. When the liquid reaches the surface, it flows outward, toward the sides of the glass.



When the current flows down the sides of the glass, it's strong enough to pull smaller nitrogen bubbles with it, creating the falling effect.

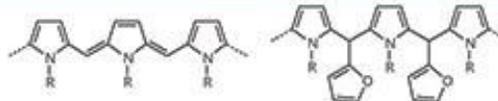
## WHAT CAUSES THE BITTERNESS OF GUINNESS?



HUMULONE — AN  $\alpha$ -ACID      ISOHUMULONE — AN ISO- $\alpha$ -ACID

During the brewing process, hops release the  $\alpha$ -acid humulone. Guinness uses hops with high levels of  $\alpha$ -acids, which isomerize when boiled to form iso- $\alpha$ -acids, the primary source of bitterness in beers.

## THE COLOR OF GUINNESS



PROPOSED STRUCTURES FOR MELANOIDIN FRAGMENTS  
(R = sugar fragments. These are just two of the many proposed structural motifs likely to occur within a single melanoidin molecule.)

The dark color of Guinness has been attributed to melanoidins. These are polymeric structures created during the malting process that give beers their dark hue. They are created by the Maillard reaction, in which sugars and proteins react when heated.



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