

COMPILATION: chemistry lab safety, OSHA, overcrowding

Date: Fri, 7 Sep 2018

From: Jane Jackson <jane.jackson@ASU.EDU>

Subject: Chemistry lab safety: safe maximum # students, safe minimum lab space per student
Overcrowding is a safety issue, especially in chemistry, so I post this.

A high school chemistry teacher posted to chemed-L listserv:

“I would like to write a letter of documentation concerning my chemistry classes and the number of students in them for the upcoming year. I teach both regular and honors level chemistry, and the class size will range from 30 to 38 students at this point. Last year, I had several classes at 34 students.

I have several articles of documentation concerning class size, such as the NSTA's position on class size and Duty or Standard of Care. I know that the recommendation is 24 students, but with our budget, the admin in the district office has set the standard at 32, but they continue to push the limit past that. Their suggestion is to allow half the students to do lab one day, and the others work on a paper assignment, then switch the next day since they are all in one classroom.

I have a combined classroom that has the front section for student desks and will not accommodate 38 desks (they will spill into the lab area and block floor space). The fume hood is on the side wall in the desk area. The back half of the classroom has a total of 6 rectangular lab tables with sinks at the end and 6 gas jets with the idea of having 36 students utilize the tables. I will need to measure the tables this week, but I think they are about 60 in length and 30 in wide.

Question #1: How do I measure the available net lab space available with this type of classroom?
Question #2: What major points should be included in the letter to the admin to address the overcrowding situation?”

A chemistry teacher replied:

The NSTA document at <http://www.nsta.org/docs/OvercrowdingInTheInstructionalSpace.pdf> has good, concise information, including bar graphs showing the dramatic increase in accidents as a result of overcrowding.

* Question #1: How do I measure the available net lab space available with this type of classroom?

NSTA guidelines are based on the floor area of the room. Students who are not working in the lab do not change the student load in a mixed-use room. The NSTA safe minimum is 60 square feet per student regardless. (I'd use the phrase "safe minimum" rather than "recommendation".)

* Question #2: What major points should be included in the letter to the administration to address the overcrowding situation?

NSTA safe maximum for number of students (24) and safe minimums for floor area (50 square feet per student for lab-only space and 60 square feet per student for mixed space). Cite accident rates, plus the fact that the school and the district would have a much harder time defending against a lawsuit, particularly if those responsible for overcrowding were aware of the safe minimums and chose to ignore them. If they want you to split the class, they would need to

provide a separate room for the students not doing the experiment, including an adult to supervise them so you can supervise the students in lab.

ACS Guidelines and Recommendations for the Teaching of High School Chemistry state: "... the ACS and the National Science Teachers Association (NSTA) recommend a maximum of 24 students per classroom based on 60 square feet per student. The NSTA has produced a position statement on the liability of science educators for laboratory safety."

<http://www.acs.org/content/dam/acsorg/education/policies/recommendations-for-the-teaching-of-high-school-chemistry.pdf>

The square footage per pupil must meet state regulations. Different state mandates may require additional square footage. Space may also be based on building and fire safety codes, appropriate supervision, and the special needs of students.

ACS Guidelines for Chemistry in Two-Year College Programs are at:

<https://www.acs.org/content/acs/en/education/policies.html>

"They echo the 50 s.f. minimum lab space and set the maximum number of lab students at 25 (Page 10). Seems in line with the NSTA safety guidelines. "

Another teacher wrote: "Check the Flinn catalog. I believe they still have the suggested amount of lab space needed per student. "

Date: Fri, 7 Sep 2018

From: Jane Jackson <jane.jackson@ASU.EDU>

Subject: A new article: "Your Blueprint for Chemical Safety Training". A summary for following the OSHA Lab Standard.

[from the NSELA E-NAVIGATOR monthly e-newsletter, received on Sept. 6, 2018.]

"Your Blueprint for Chemical Safety Training" - Chemicals present an unusual set of safety concerns and requirements. This article provides a summary for following the OSHA Lab Standard. Based either on legal safety standard under OSHA or better professional practices - all school science labs need to follow this safety standard. Read it at:

<http://ohsonline.com/articles/2018/09/01/your-blueprint-for-chemical-safety-training.aspx>

From: Devin Ditmore, a long-time modeler in Springerville, AZ

Sent: Monday, September 10, 2018

A long time ago (20 years) **I contacted OSHA**; they sent a letter to our counselors office stating that the maximum capacity for the chemistry lab is 26 and than more than that is a safety violation; **I have had classes capped at 26 ever since.**

Sept. 12, 2018

From: Jim Deane, long-time modeler in Kansas

Referring to: * Question #1: How do I measure the available net lab space available with this type of classroom?

It is important to note that the "net lab space" is the total floor area of the room (wall to wall) with the area taken by cabinets, furniture, and equipment subtracted. *Net space is the free square footage available for student movement.*

Date: Fri, 21 Sep 2018

From: Cameron Nickerson, a long-time modeler in California

My recommendation for anyone is to double check how that measurement is taken. Our EdCode square foot requirements include prep areas that the students may not ever see. Sketchy, I agree, but that's the way it's written. My point is, whoever you are referencing, *make sure you know what and how they measure.*