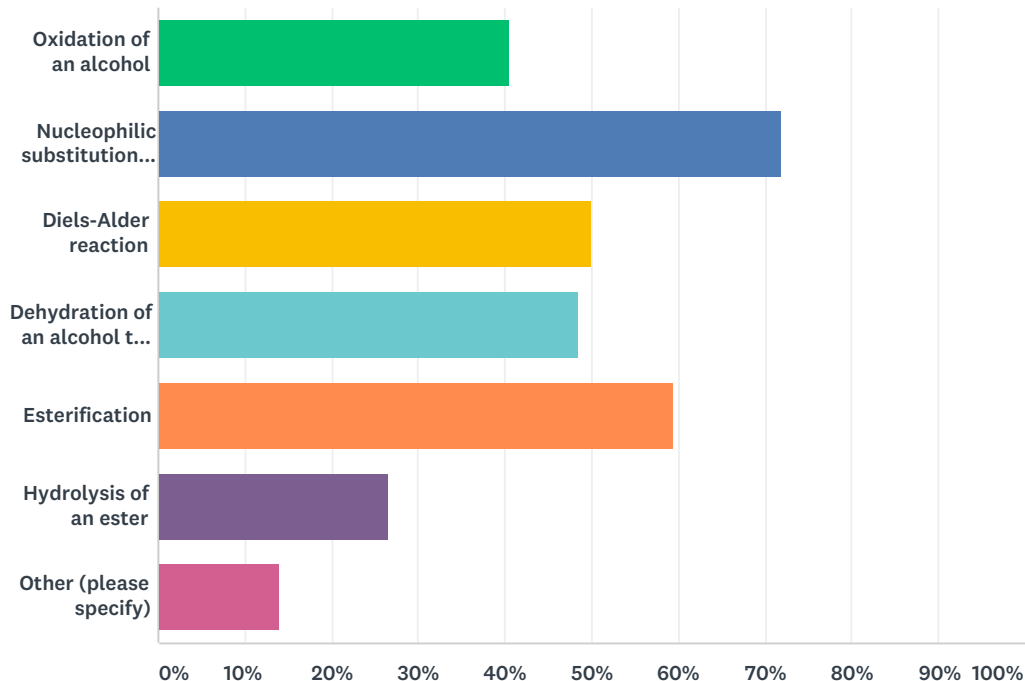


Q1 Which of these experiments have you used or seen used most often in the undergraduate organic chemistry laboratory courses that you are familiar with? Choose up to 3.

Answered: 64 Skipped: 0



ANSWER CHOICES	RESPONSES
Oxidation of an alcohol	40.63% 26
Nucleophilic substitution reactions	71.88% 46
Diels-Alder reaction	50.00% 32
Dehydration of an alcohol to an alkene	48.44% 31
Esterification	59.38% 38
Hydrolysis of an ester	26.56% 17
Other (please specify)	14.06% 9
Total Respondents: 64	

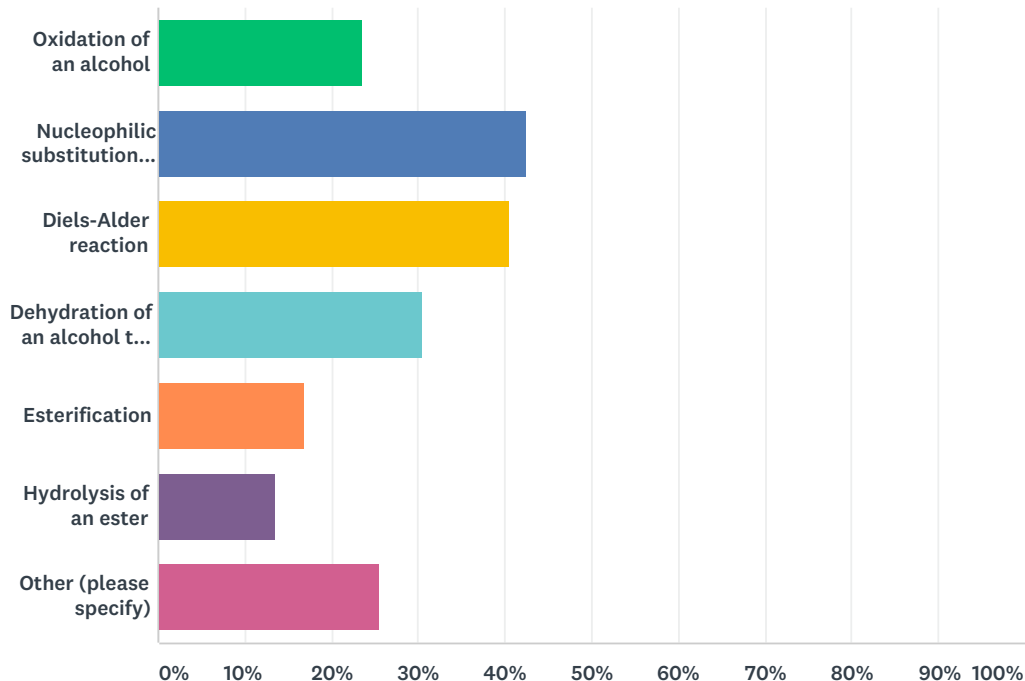
#	OTHER (PLEASE SPECIFY)	DATE
1	Grignard reaction	5/9/2019 2:04 PM
2	Grignard reaction, Halogenation of alkene	5/9/2019 12:39 PM
3	We do all of these.	5/8/2019 12:37 PM
4	my school didn't have organic chemistry courses, only a bio-organic course	5/8/2019 1:28 AM
5	Friedel-Crafts acylation	5/7/2019 1:40 PM
6	All listed experiments are used in the Organic Chem Lab; Grignard Synthesis of Triphenylmethanol is also used regularly	5/6/2019 1:07 PM

Organic Class Laboratory Safety Topics Survey

7	All of the above plus Grignard, Sodium Borohydride Reductions, Radical Halogenation, etc.	5/6/2019 12:41 PM
8	nitric acid oxidation	5/6/2019 12:11 PM
9	Grignard	5/6/2019 8:24 AM

Q2 In your experience, which of these experiments do students struggle with the most, either of terms of the techniques or the science? Choose 3.

Answered: 59 Skipped: 5



ANSWER CHOICES	RESPONSES
Oxidation of an alcohol	23.73% 14
Nucleophilic substitution reactions	42.37% 25
Diels-Alder reaction	40.68% 24
Dehydration of an alcohol to an alkene	30.51% 18
Esterification	16.95% 10
Hydrolysis of an ester	13.56% 8
Other (please specify)	25.42% 15
Total Respondents: 59	

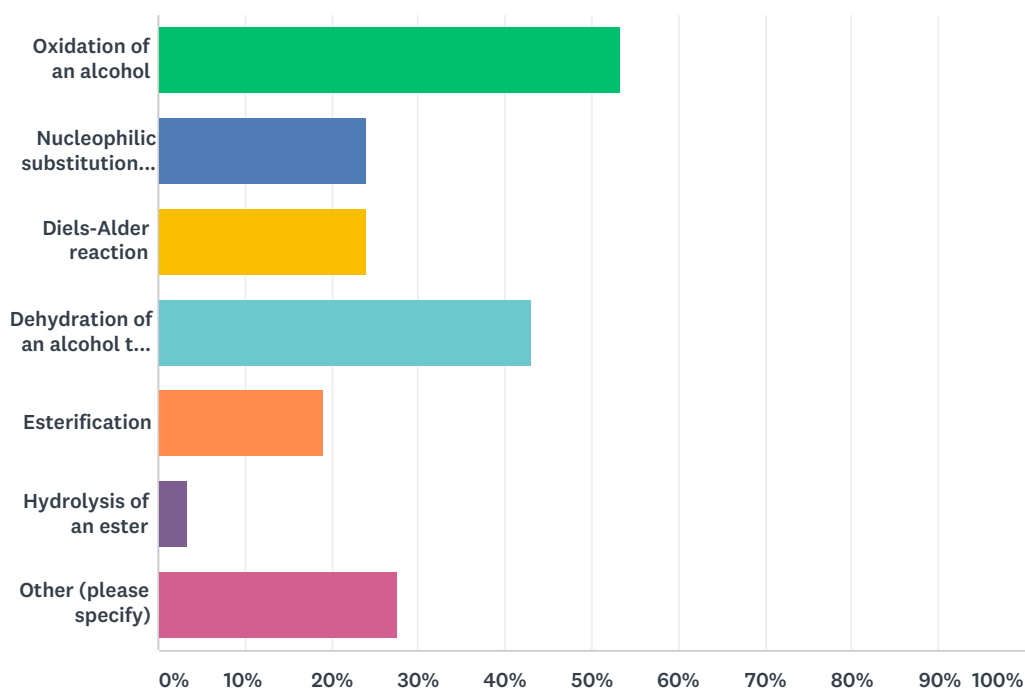
#	OTHER (PLEASE SPECIFY)	DATE
1	N/A	5/10/2019 9:49 AM
2	Grignard reaction	5/9/2019 2:04 PM
3	Experiments containing column chromatography or liquid-liquid extraction	5/9/2019 12:39 PM
4	Friedel-Crafts acylation	5/7/2019 1:40 PM
5	Grignard Synthesis of Triphenylmethanol	5/6/2019 1:07 PM
6	All of them	5/6/2019 12:41 PM
7	Grignard Reaction	5/6/2019 11:58 AM

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8	Been too long, can't remember	5/6/2019 10:57 AM
9	when they approach chmeistry like cooking	5/6/2019 10:35 AM
10	Qualitative unknowns	5/6/2019 9:43 AM
11	level of challenge is fairly similar between them	5/6/2019 9:16 AM
12	Grignard reactions	5/6/2019 8:49 AM
13	Pd catalyzed hydrogenation	5/6/2019 8:44 AM
14	Chromatography	5/6/2019 8:43 AM
15	Grignard Reaction	5/6/2019 8:39 AM

Q3 In your experience, which of these experiments has the most safety hazards? Choose up to 3.

Answered: 58 Skipped: 6



ANSWER CHOICES	RESPONSES	
Oxidation of an alcohol	53.45%	31
Nucleophilic substitution reactions	24.14%	14
Diels-Alder reaction	24.14%	14
Dehydration of an alcohol to an alkene	43.10%	25
Esterification	18.97%	11
Hydrolysis of an ester	3.45%	2
Other (please specify)	27.59%	16
Total Respondents: 58		

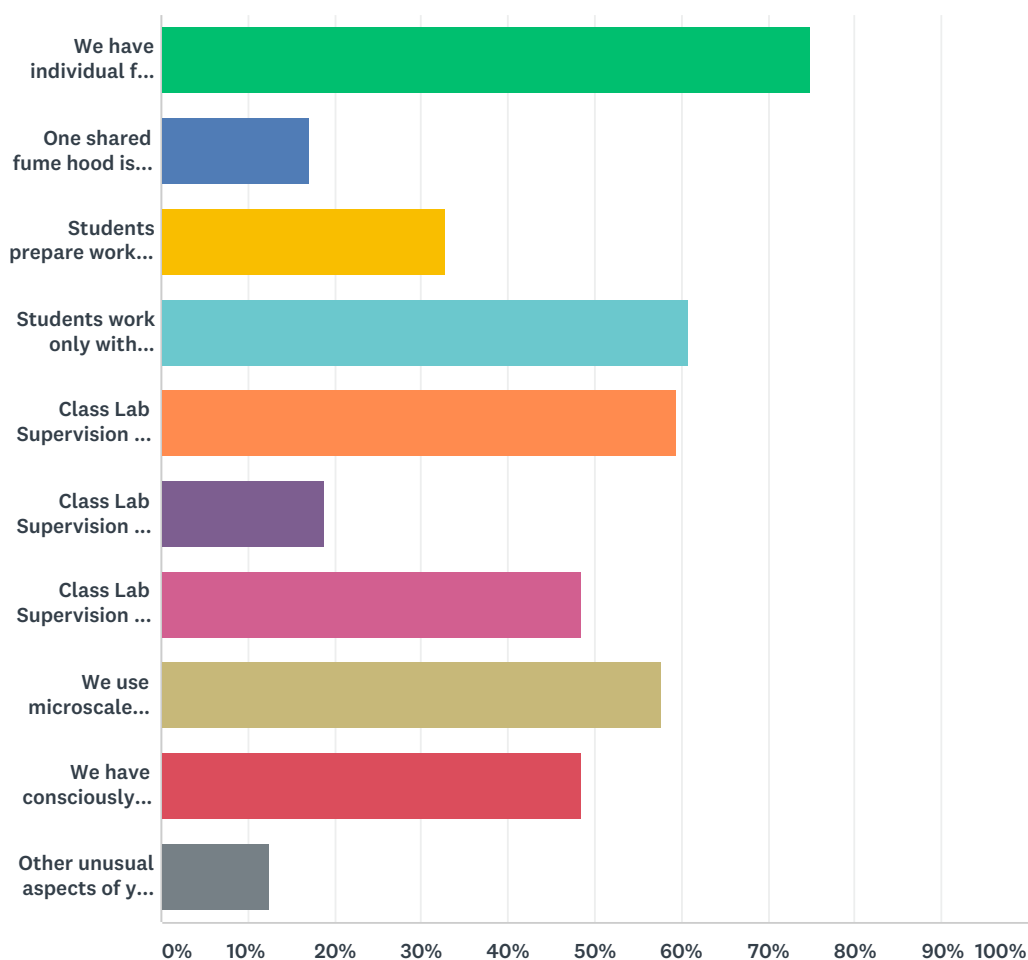
#	OTHER (PLEASE SPECIFY)	DATE
1	Difficult to name a few, bec. we have various ways to avoid hazards we make certain to teach.	5/11/2019 3:38 PM
2	Reduction of ketone/aldehyde	5/10/2019 9:49 AM
3	Grignard reaction	5/9/2019 2:04 PM
4	Brominations	5/7/2019 4:32 PM
5	Grignard Synthesis of Triphenylmethanol	5/6/2019 1:07 PM
6	Radical Halogenation, Grignard, Oxidation using permanganate, Dehydration using strong acid, any strong base reaction, etc.	5/6/2019 12:41 PM
7	Grignard organometallics	5/6/2019 12:11 PM

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8	Grignard Reaction	5/6/2019 11:58 AM
9	none are particularly hazardous in the manner we perform them but all workups that involve reflux, distillation, extraction, strong acid/base catalysis or promotion require special attention	5/6/2019 11:55 AM
10	sulfonyl chloride synthesis	5/6/2019 11:01 AM
11	Been too long, can't remember	5/6/2019 10:57 AM
12	use of halogens and substances such as aniline; general negligence of process	5/6/2019 10:35 AM
13	none are particularly more hazardous than another	5/6/2019 9:16 AM
14	Grignard reactions	5/6/2019 8:49 AM
15	Pd catalyzed hydrogenation	5/6/2019 8:44 AM
16	Grignard Reaction	5/6/2019 8:39 AM

Q4 Which of these facility, resources and practices best describe your organic teaching lab practices? Select all that apply

Answered: 64 Skipped: 0



ANSWER CHOICES	RESPONSES	
We have individual fume hoods for each student or student team team to use	75.00%	48
One shared fume hood is used by the whole class; other work is done on the bench top	17.19%	11
Students prepare working reagents from concentrated stock reagents	32.81%	21
Students work only with working reagents pre-diluted to working strength	60.94%	39
Class Lab Supervision is provided by graduate student TAs,	59.38%	38
Class Lab Supervision is provided by undergraduate TAs	18.75%	12
Class Lab Supervision is provided by faculty or experienced staff chemists	48.44%	31
We use microscale chemistry when possible	57.81%	37
We have consciously developed greener chemistry work for undergraduate organic labs	48.44%	31
Other unusual aspects of your organic chemistry laboratories	12.50%	8

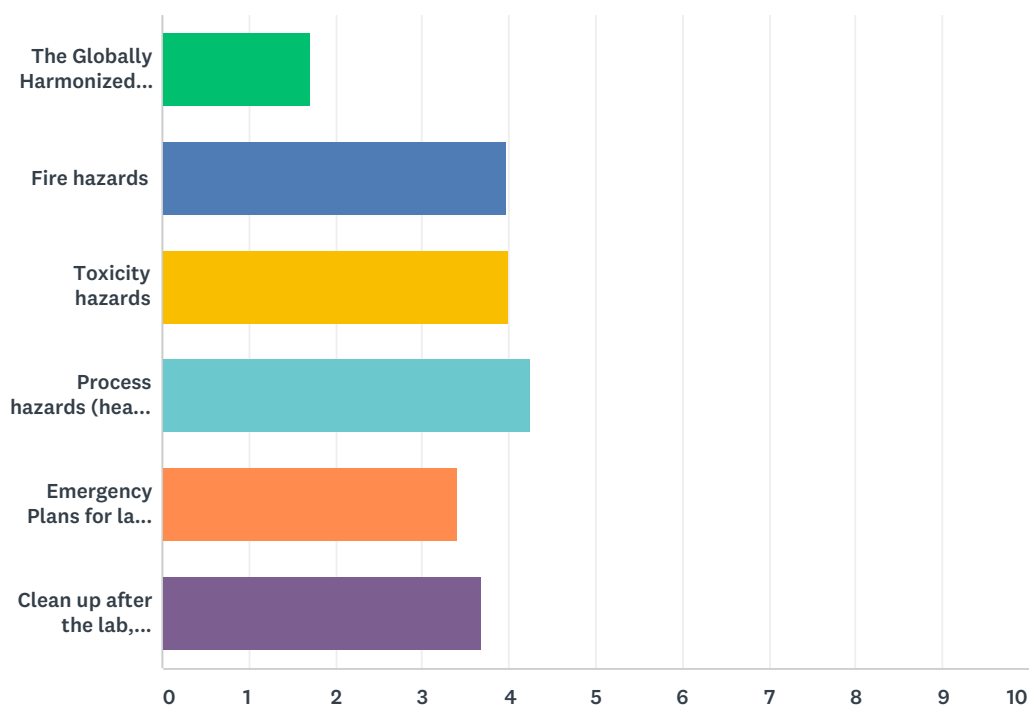
Organic Class Laboratory Safety Topics Survey

Total Respondents: 64

#	OTHER UNUSUAL ASPECTS OF YOUR ORGANIC CHEMISTRY LABORATORIES	DATE
1	benches have a minimal exhaust system built in	5/7/2019 1:40 PM
2	A student worker (TA) is also in the lab with the instructor.	5/6/2019 2:26 PM
3	We use small scale approaches at all times; students do not bring reagent bottles to their work areas; we have a small number of students per TA between 12 and 14	5/6/2019 11:55 AM
4	use ecofunnels to collect chemical waste	5/6/2019 11:01 AM
5	The lab looks worse and worse each year from a lack of cleaning, technicians do not clean up or allow undergraduates to do this work	5/6/2019 9:43 AM
6	Whenever possible, the experiment is inquiry based, in that the student is NOT told what she is making but is expected to determine the structure from spectra and the chemistry	5/6/2019 8:48 AM
7	We design labs to minimize hazardous waste generation.	5/6/2019 8:44 AM
8	Emphasis on hands-on spectroscopy (IR, NMR)	5/6/2019 8:43 AM

Q5 Please rank these lab safety topics in order of importance for the organic chemistry student to understand and evaluate

Answered: 63 Skipped: 1



	1	2	3	4	5	6	TOTAL	SCORE
The Globally Harmonized System	3.23% 2	3.23% 2	3.23% 2	4.84% 3	22.58% 14	62.90% 39	62	1.71
Fire hazards	16.13% 10	24.19% 15	20.97% 13	24.19% 15	9.68% 6	4.84% 3	62	3.98
Toxicity hazards	20.97% 13	20.97% 13	25.81% 16	11.29% 7	11.29% 7	9.68% 6	62	4.00
Process hazards (heat, pressure, glassware problems)	26.98% 17	15.87% 10	26.98% 17	19.05% 12	7.94% 5	3.17% 2	63	4.25
Emergency Plans for lab events	14.52% 9	12.90% 8	14.52% 9	24.19% 15	24.19% 15	9.68% 6	62	3.40
Clean up after the lab, including waste disposal	19.35% 12	22.58% 14	8.06% 5	16.13% 10	24.19% 15	9.68% 6	62	3.68

Q6 Please share any other ideas you have about resources that would help undergraduate organic chemistry students learn how to identify and assess laboratory safety hazards

Answered: 23 Skipped: 41

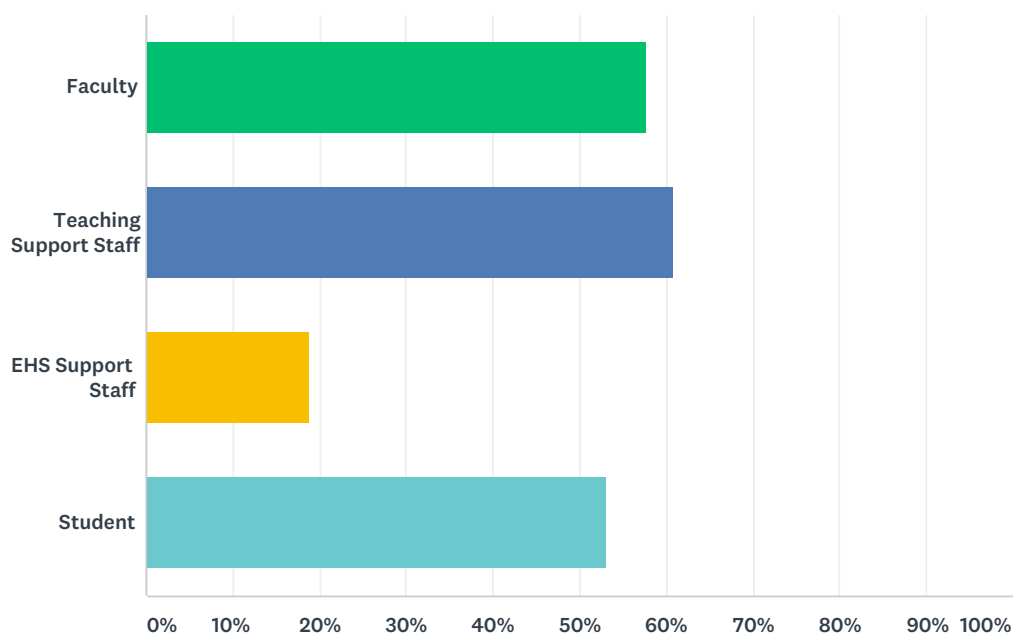
#	RESPONSES	DATE
1	Constant reminder to apply safety rules, have students remind each other.	5/11/2019 3:38 PM
2	We have been unable to find inexpensive training materials, and the materials that have been developed by our CHO are not very useful to students. Having the ACS provide templated materials (reading SDS, understanding GHS, waste disposal, good laboratory techniques, etc.) that can be adapted to individual schools would be immensely useful.	5/10/2019 9:49 AM
3	Hands on training is very critical to conduct any reaction safely in undergraduate organic teaching lab.	5/9/2019 2:04 PM
4	A mobile app allowing msds and related safety information to be readily accessed.	5/9/2019 1:32 PM
5	Videos highlighting how to perform laboratory techniques which would increase knowledge and reduce safety hazards associated with techniques	5/9/2019 12:39 PM
6	Online safety training modules would be great. Adding safety learning objectives to a lab course is great but problematic - students are already overwhelmed with too much information. New techniques, concepts, time management, data interpretation, etc. This leaves little brain capacity to learn chemical hazard training. Coupled with the fact that most students are not chemistry majors, there is little incentive to learn "esoteric" safety hazards. students just want to survive and move on.	5/8/2019 5:33 PM
7	Establish an online system where they take prelab quizzes geared towards safety.	5/7/2019 2:02 PM
8	Teaching students to identify hazards from an SDS and making the exercise a mandatory part of the pre-lab has been helpful	5/7/2019 1:40 PM
9	PSU presents a hazard data table in the safety manual which includes the hazard statements for each chemical used and a link to their SDS. Each lab also includes a section of safety information with specific lab hazards included (hot items, gas evolution, special/new chemical hazards like using Pd/C).	5/7/2019 10:26 AM
10	Have them take pre-laboratory quizzes about the hazards associated with the experiment.	5/6/2019 2:26 PM
11	Online Risk Assessment Form linked to SDS.	5/6/2019 12:41 PM
12	-Teaching how to read and evaluate SDS for handling information, including section 2 hazards and section 11 toxicity and exposure minimization -Teaching critical thinking and creating a safety culture to encourages students to ask appropriate clarifying safety questions, rather than accepting materials as is in experimental protocol -	5/6/2019 12:11 PM
13	It would be nice to have a collection of short video resources (as a series) that could be implemented into my course's LMS. This way I could tether videos into assignments. While there are videos out there, it would be nice to use a collection of videos from a singular, well recognized resource.	5/6/2019 11:58 AM
14	Videos that show correct vs incorrect actions/set ups/responses/	5/6/2019 11:55 AM
15	Chemical compatibility families information	5/6/2019 11:01 AM
16	Risk assessment tools make excellent pre-lab assignments	5/6/2019 10:57 AM
17	Waste identification	5/6/2019 10:53 AM
18	someone actually needs to do a risk assessment and create a plan including waste handling for someone running the lab-actually doing this seems to be a bit of a unicorn	5/6/2019 10:35 AM
19	Videos with real life experiences	5/6/2019 10:32 AM

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20	Including students [even the first year students] in all aspects of safety planning of xperiments is paramount from the outset to put students into the frame of mind that safety is always THEIR concern as well as the faculty and staff. It is critical to explain to all students where an xperiment can go sideways so they are ready for it if it does happen. This also includes PROPER waste disposaL. Hopefully the safety first lessons stay with them throughout their career.	5/6/2019 10:21 AM
21	Incorporate a safety point before lecture/experiment and evaluate this safety point after each experiment or in post lab report.	5/6/2019 9:43 AM
22	Organic students often are dealing with information overload. Trying to teach them 'chemical safety' from the perspective of the technical details often is not effective due to the information overload.	5/6/2019 8:48 AM
23	Provide an on-line, FREE resource that is generic enough to apply to (almost) every institution, that provides GRADES that can be easily electronically manipulated into class spreadsheets. Unless there is a grade element, students will ignore training, and assume someone else is responsible for their safety.	5/6/2019 8:43 AM

Q7 Which of the following roles have you engaged in for undergraduate organic teaching labs?

Answered: 64 Skipped: 0



ANSWER CHOICES	RESPONSES	
Faculty	57.81%	37
Teaching Support Staff	60.94%	39
EHS Support Staff	18.75%	12
Student	53.13%	34
Total Respondents: 64		