Lab safety

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- what comes to your mind?

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A tragic example of missing lab safety…

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LAB SAFETY

10 years after Sheri Sangji's death, are academic labs any safer?

Chemists discuss their efforts

by *Jyllian Kemsley*

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On Dec. 29, 2008, Sheharbano "Sheri" Sangji was **working on a chemical synthesis** in a lab at the University of California, Los Angeles. One of the reagents she was using was *tert*-butyllithium (*t*-BuLi), which ignites spontaneously in air. It was likely only the second time she had handled such a hazardous substance. She had graduated from college a few months earlier and was working in the lab as a staff scientist while applying to law schools.

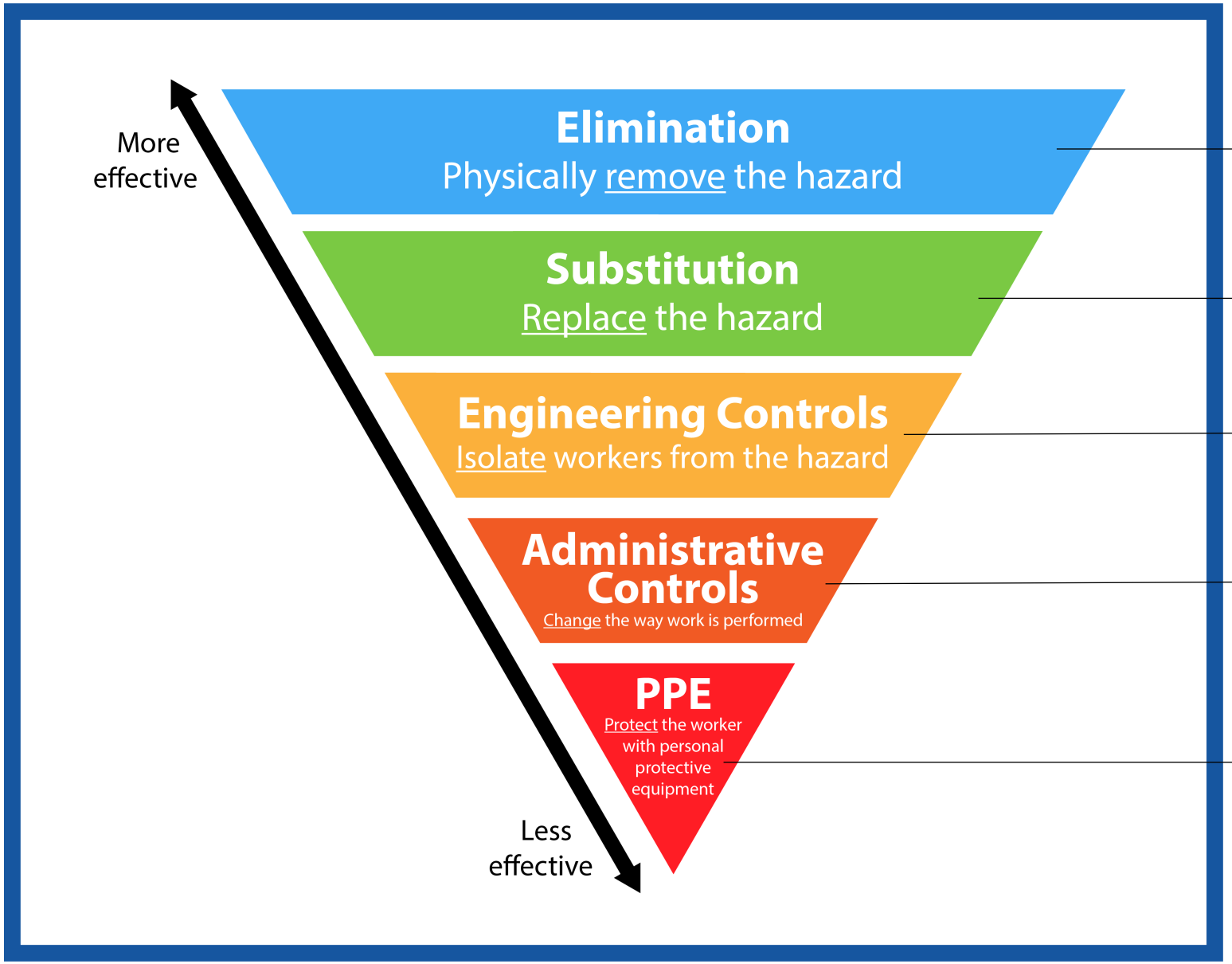
She was transferring a total of 160 mL of *t*-BuLi solution using a 60 mL plastic syringe, **according to her lab notebook**. For unknown reasons, the plunger came out of the syringe barrel and the *t*-BuLi was exposed to the atmosphere. The *t*-BuLi ignited, along with Sangji's clothes. She wore nitrile gloves, no lab coat, and possibly no eye protection. A lab mate attempted to use a lab coat to smother the fire, then started pouring water on Sangji from a nearby sink.

"Her clothing from the waist up was largely burned off, and large blisters were forming on her abdomen and hands—the skin seemed to be separating from her hands," the lab supervisor, chemistry professor Patrick Harran, later recalled for investigators. Sangji died from her injuries on Jan. 16, 2009. She was 23 years old.

Credit: Courtesy of Naveen Sangji

Sheri Sangji

Hierarchy of hazard controls



Examples

- Is the dangerous chemical necessary?
- Can the dangerous chemical be substituted with something less harmful?
- Work in fume hood
- Proper training, signs around work area
- Lab coat, gloves, safety glasses...

National Institute for Occupational Safety and Health

- Reaction: $NaOH + H_2O_2 + CAT \rightarrow H_2O + O_2 + CAT$

- Equiptment?

Make „risk assessment“ in small steps:

- where do you find safety information?
- what are the SDS (Safety Data Sheet)?
- what do the Pictograms mean?
- what protective equipment should you therefore use?

Useful sources of safety information (other sources at not ok):

- kemibrug.dk (use for safety quiz)
- pubchem.ncbi.nlm.nih.gov
- www.chemspider.com

Suppliers of chemicals:

- www.goodfellow.com
- www.alfa.com
- www.sigmaaldrich.com

Hazard statements:

- E.g., www.msds-europe.com/h-statements
- or just google search on e.g. “H318 hazard”

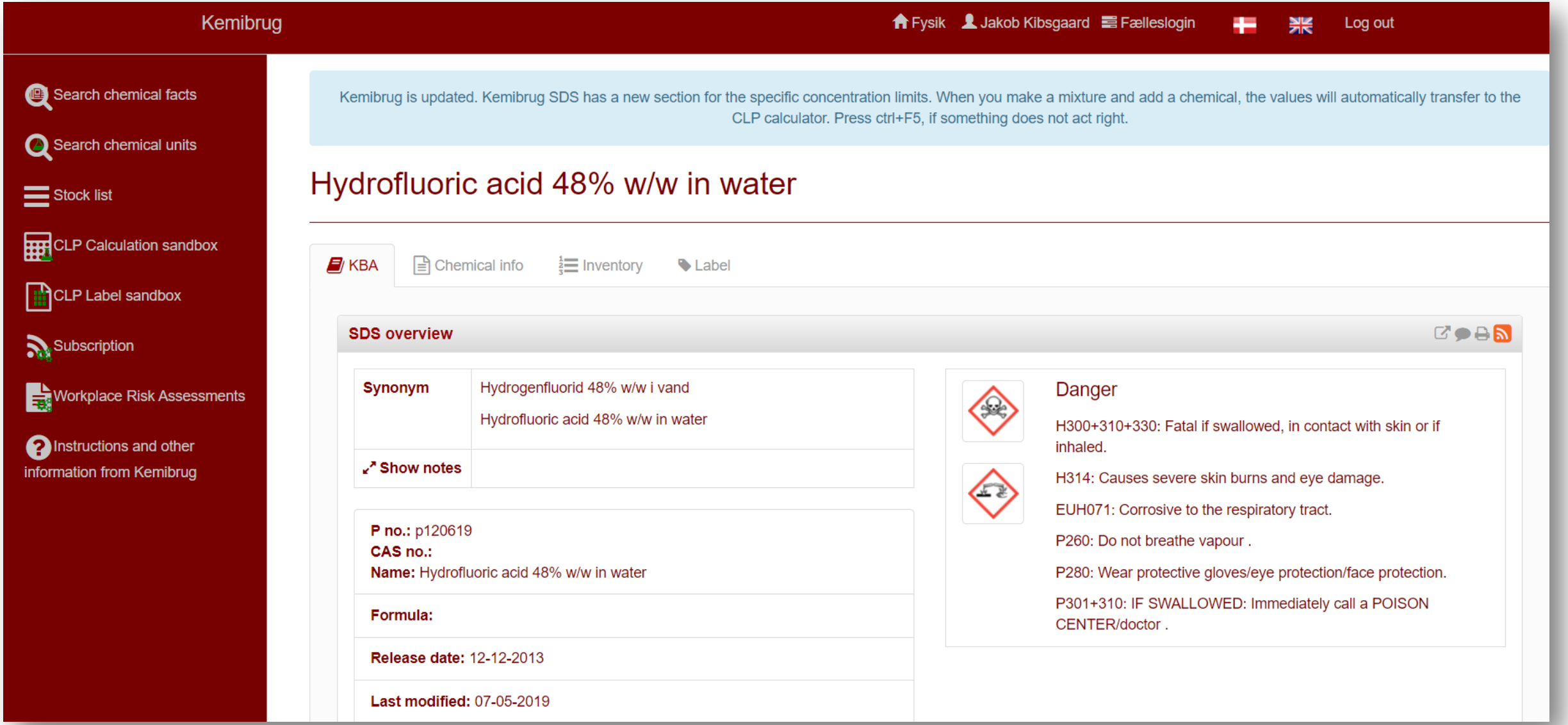
What does it contain (among others) ?

KBA = kemikalie brugsanvisning (chemical instructions)

SDS = Safety Data Sheet

- Pictograms
- H-Statements
- Precaution statements
- Other hazard information
- First aid information
- Protective equipment to use
- Toxicological information
- Disposal considerations
- ...

Example: Hydrofluoric acid



Go find the SDS in "kemibrug.dk" for:

- H_2O_2 10% w/w in water
  (Search "hydrogen peroxide")
- NaOH 0.2 M in water
  (Search "sodium hydroxide")
- Nickel (particle diameter <1mm)

- Pictograms
- H-Statements
- Precaution statements
- Other hazard information
- First aid information
- Protective equipment to use
- Toxicological information
- Disposal considerations
- ...

Find these data and evaluate potential risks, precautions, protective equipment to use...

Exercise part 2: What do the Pictograms mean ?

- Find out what they mean

What protective equipment to use ?

- Protective gloves (which ones?)
- Protective clothing (Lab Coats)
  - Closed shoes
- Eye protection (Goggles)
- (Face protection (Breathing mask))

… AND …

NO FOOD IN THE LAB !!!

NOT EVEN WATER OR COFFEE !!!

Rules 1

Make sure that

- you don’t get **any** chemicals in your face (eyes!)
- you don’t get **any** chemicals on your skin (hand etc.)
- you don’t get **any** chemicals on your cloths (Coat, Shoes)
- you don’t inhale **any** chemicals (especially powders!)

NEVER taste, swallow, inhale any chemicals!
NEVER touch any chemicals without gloves!

Always wear protective clothing, goggles and gloves!
But **only** in lab and to **not touch e.g. door handles with gloves**

Rules 2

- NEVER point the opening of a flask towards a person
- Always follow the orders of the TAs
- NO Food or beverages in the lab
- Be careful if you have long hair (fix it somehow)
- Only dispose chemicals as told by the TAs
- Never pour chemicals in the sink
- Avoid spillage of chemical and tell TAs, if that happens

How clean up ?

Environmentally correct:

- Separate stuff as much as possible
- Dispose in proper container (ask TAs)
  - liquids
  - solids

In general

- Follow DTU's rules
- Follow the TA's orders

Safety test on learn

You must pass this test
(min. 85%) to be admitted to lab!

Notes:
Even an irritant *is* harmful
10% H_2O_2 since no safety info is available for lower concentrations
Nickel powder since handling (e.g. sanding) a Ni wire could create particulates

Safety test on learn

You must pass this test (min. 85%) to be admitted to lab!

Experiments

Enter middle door

Lectures

My office in temporary building

Building: 312A

Room: 013

Notes:

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