Laboratory Safety

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…Lab Safety Program

- Emergency response
- Hazard identification and communication
- General safety fire hazards and fire safety
- Chemical hazards, hygiene and spill management
- Biological hazards and spills management
- Hazards from compressed gases
- Radiation hazards
- Medical emergencies
- Accident reporting
- Laboratory safety - Handling glassware and safety practices for disposal of broken glassware, Centrifuge safety, Bio-safety levels, Effective use of biological safety cabinets
- Biological safety housekeeping
- Safety education and training program
- Safety surveys

Designing for safety in micro labs – in terms of engineering controls

- New Laboratory lab designing
- Existing Laboratory lab designing modifications and limitations
- What type of cabinets and their maintenance
- Workflow in bio-safety cabinet
- Maintenance of – Biosafety- HEPA/ULPA filters, Calibration frequency

…Lab Safety Program

- **Hazard Identification And Communication**
  - Types of hazards may include biological, chemical, electrical, radiation and fire.

- Emergency Plan
  - Key elements of an emergency procedure plan are summarized by the acronym **NEAR**
    - **N**otify
    - **E**vacuate
    - **A**ssemble
    - **R**eport

EMERGENCY PROCEDURES

FOR SPILLS/LEAKS OF HAZARDOUS MATERIALS

Assist any person in Danger

IF SAFE TO DO SO

Notify your supervisor

Restrict the danger area. Attend to the emergency.

E.g. Contain spill. Isolate gas, electricity.

IF TRAINED TO DO SO

Evacuation of staff/visitors to safe assembly area

Safety Officer

- Who Should be safety officer

- Role of safety officer
  - safety advisor to laboratory
  - ensure that safety procedures are documented
  - act as a liaison with the institutions safety officers
  - communicate policy changes to co-workers
  - coordinate internal safety inspections
  - ensure that equipment is properly maintained
  - keep records of hazards and problems within the laboratory

Hazards and Gadgets

- What are different types of hazards? How once should report? Whom one should report?
  - What should be action plan?

- Role of Safety gadgets

Fire

- Fire Extinguishers –
  - Which type
  - How many
  - Where to keep
  - Training of use
  - Frequency of drills

Electrical

- Electrical Safety –
  - Place of fittings, securing those fitting, maintenance, UPS backup, its maintenance, Reaction time monitoring, usage of extension cords

Chemical

- Chemical safety –
  - Type of hazardous chemicals in lab- there classes with example
  - Use of cytotoxics in lab – examples and monitoring, hazards, exposure management
  - Safety measures in terms of
    - Storage and use
    - What PPE should be use

…Chemical Hygiene Plan (CHP)

Purpose

Provide guidance and protocols for the protection of employees and safety from health effects of laboratory hazardous materials.

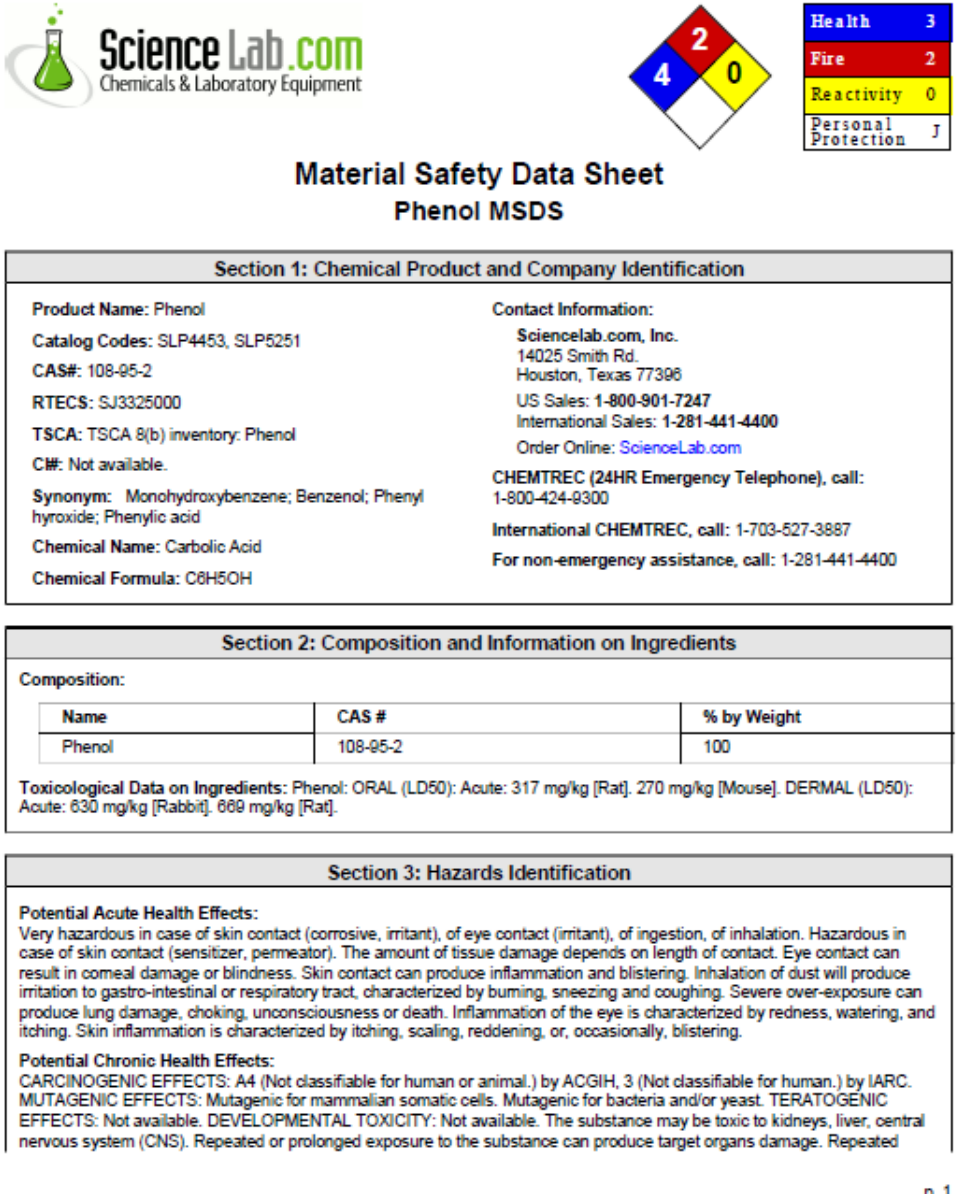
- Each location must:
  - Assign a Chemical Hygiene Officer
  - Identify all locations where laboratory hazardous chemicals will be kept including “designated areas” where specific classes of chemicals will be stored
  - Identify hazardous chemical inventory
  - Update floor plans to assure all needed emergency equipment is in place and properly identified

Chemical Hazards

- Creation of Protocols
- Creation of HAZMAT teams
- Provision of PPE
- Classes and awareness drives
- Implement
- Mock
- Review

Material Safety Data Sheets (MSDS):

A technical document provided by chemical suppliers that describes the specific properties of a chemical.



ScienceLab.com
Chemicals & Laboratory Equipment

Material Safety Data Sheet
Phenol MSDS

Section 1: Chemical Product and Company Identification

Product Name: Phenol

Catalog Codes: SLP4453, SLP5251

CAS#: 108-95-2

RTECS: SJ3325000

TSCA: TSCA 8(b) inventory: Phenol

CI#: Not available.

Synonym: Monohydroxybenzene; Benzenol; Phenyl hyroxide; Phenylic acid

Chemical Name: Carbolic Acid

Chemical Formula: C6H5OH

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Phenol	108-95-2	100

Toxicological Data on Ingredients: Phenol: ORAL (LD50): Acute: 317 mg/kg [Rat]. 270 mg/kg [Mouse]. DERMAL (LD50): Acute: 630 mg/kg [Rabbit]. 669 mg/kg [Rat].

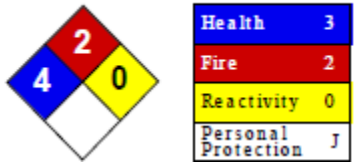
Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (sensitizer, permeator). The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated

MSDS

- Types of information typically provided:
  - » Chemical name
  - » Chemical supplier
  - » Composition and ingredients information
  - » Potential health effects
  - » Exposure levels, with specific concentrations and times
  - » First Aid Procedures
  - » Fire fighting procedures
  - » Accidental release procedures
  - » Handling and storage procedures
  - » Recommended personnel protection
  - » Physical and chemical properties
  - » Stability and reactivity
  - » Toxicological information
  - » Environmental impact
  - » Disposal Recommendations
  - » Transportation information
  - » Regulatory information

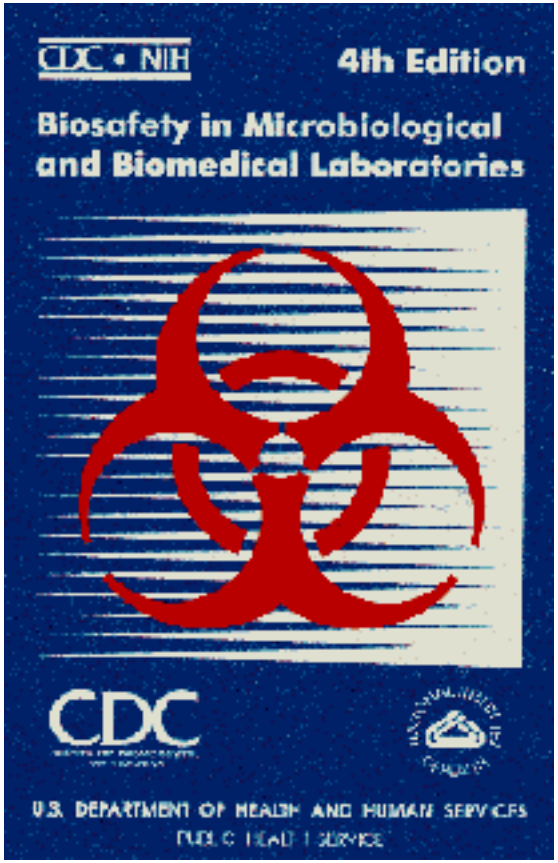


Biological safety

- Precautions during sampling, storage and transport of clinical samples
- Standard Precautions, which PPE to be used where in microbiology lab – section wise
- Sample inoculation in routine diagnostic lab – ambient Vs biosafety cabinet
- Management of spills- major spills, minor spills, spill response plan, spill response procedure
- Management of broken glassware, infected, non infected
- Mailing biological material

Biosafety in Microbiological and Biomedical Laboratories (BMBL)

- http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4toc.htm



Biosafety Levels (BSL) Defined

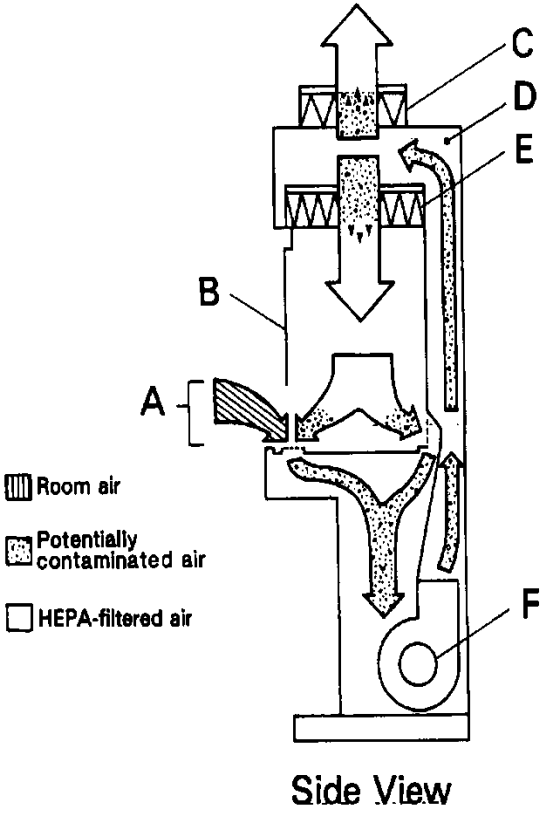
- BSL-1: Level to handle a microorganism **not known to cause disease in humans**, with minimal community risk
- BSL-2: Level to handle a microorganism that **causes human disease**, with minimal community risk
- BSL-3: Level to handle a microorganism that **causes serious (or potentially lethal) human disease** (e.g. Asian H5N1, H1N1)
- BSL-4: Level to handle a microorganism that **causes life threatening disease** in humans

Containment/Barriers

- “Box within a box” concept
- Equipment – “primary barriers”
  - Biological safety cabinets (BSCs) – Class II
  - Aerosol-resistant centrifuge cup holders
  - Horsefall-type bird cages
- Facilities – “secondary barriers”
  - Building design to control traffic
  - Air flow/HEPA filtration
  - Sewage/waste treatment

Class II BSC

- Provides personnel, environment, *and* specimen protection



Housekeeping

Clean Up after yourself!

Balances, Centrifuges, other common equipment.

Freezers and Refrigerators

- What type of liquids detergent to be used
- Mopping cycle
- PPE for housekeeping staff
- Management and reporting of incidents
- Training schedule

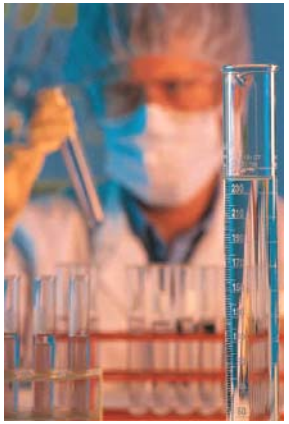
Reporting and Auditing

Forms

- Components
- Who should perform audit?
- Frequency of revision of safety policies

Safe Handling of Laboratory Equipment

- Aerosols
- Selection and Use of Equipment
- Centrifuges
- Mixing Apparatus
- Freezing Apparatus
- Vacuum/Aspirating Equipment
- Needles and Syringes
- Pipettes, Selection of a Mechanical Pipetting Aid, Safe Use of Pipettes
- Autoclaves
- Miscellaneous Equipment



Exposure Inoculation Injury

	Procedures
Sample collection	**Changing blade**
Operating/assisting	**RBS testing**
Repairing needle destroyer	**Putting away the needle**
Cleaning microscope	**Cleaning the crash cart**
Replacing Injection tray	**Recapping the needle**
Standing close to Nurse having exposed needle	**Transfer of garbage**

Standard Laboratory Safety Practices

- Use mechanical pipetting devices (no mouth pipetting)
- Wear disposable gloves/wash hands frequently
- Avoid touching eyes, face
- Decontaminate work surfaces after each activity
- Clean and disinfect spills and splashes promptly
- Restrict or limit access to laboratory
- Prohibit eating, drinking and smoking
- Proper disposal of waste materials

Standard Laboratory Safety Practices (cont'd)

- Safe use/disposal of sharps
  - Place in biohazard sharps containers only
  - DO NOT place in paper waste containers
- Use appropriate Personal Protective Equipment (PPE) as needed

Regular Health Checks- staff

Safety Surveys

- Safety surveys are similar to safety audits except they do not evaluate management, attitudes, nor do they ensure that safety programs are in place

- Safety surveys are conducted as walk-throughs of the physical areas of the laboratory and related areas, with the goal of identifying safety hazards and concerns

Personnel Safety Practices

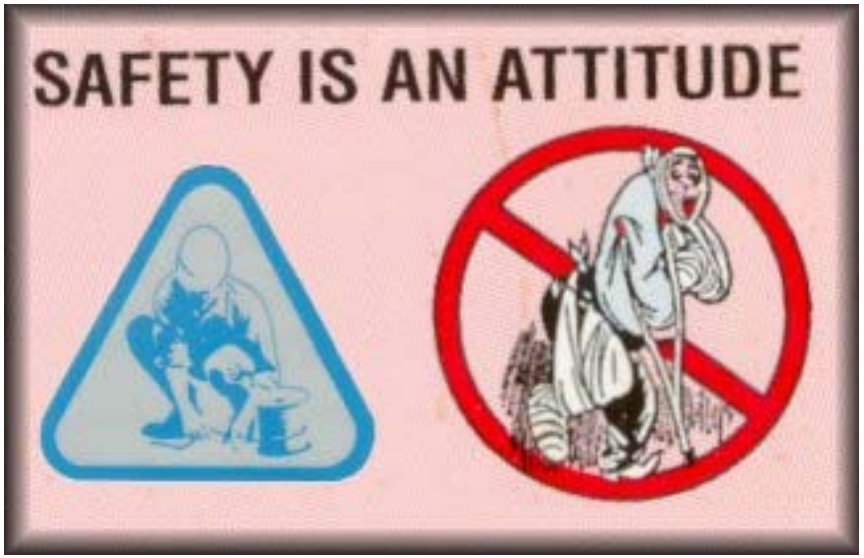
- Be sure that you are informed about the hazards that you encounter in the laboratory.
- Be aware of emergency protocols.
- When in doubt about a hazardous material or procedure, ask
- Use personnel protective wear such as lab coats and safety glasses
- Do not eat, drink, smoke, or chew gum in the laboratory
- Avoid practical jokes and/or horse play
- Use gloves when in doubt
- Wash your hands regularly

…Personnel Safety Practices

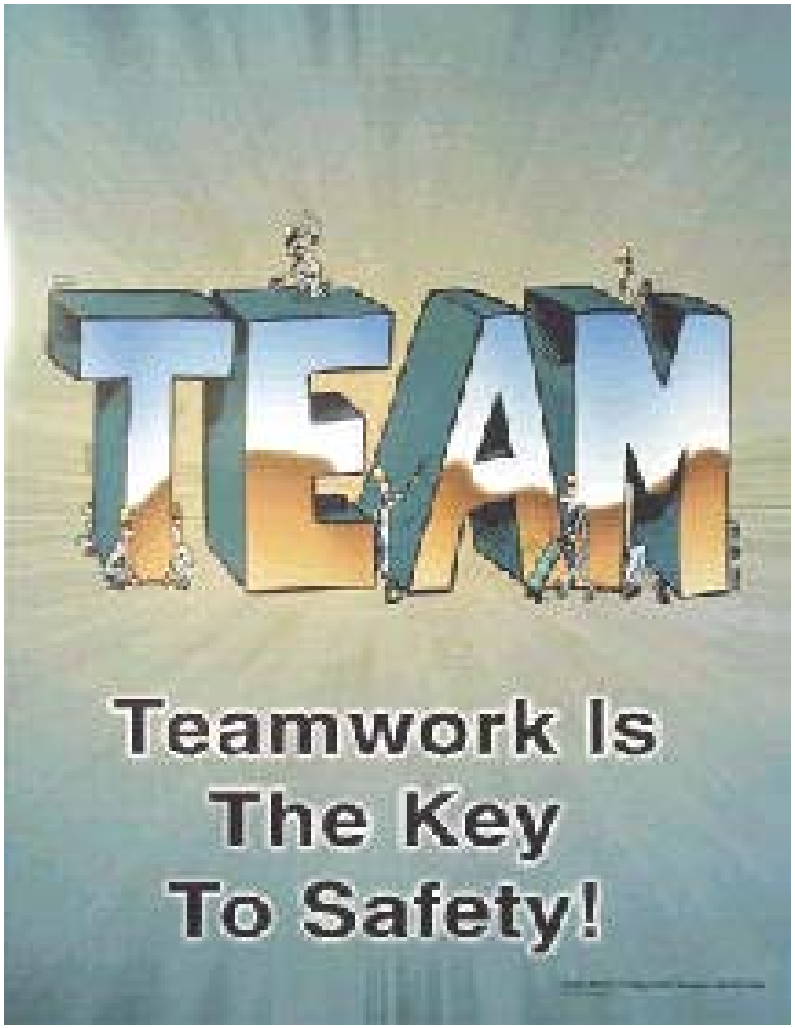
- Always wash your hands thourougly before leaving the laboratory
- Disinfect your workspace before starting work and when finishing
- Read the labels of chemicals carefully
- Read procedures before performing them and visualize hazardous steps
- Minimize use of sharps (needles, broken glass) and know how to dispose of them
- Clean up spills and pick up any dropped items immediately
- Label everything clearly
- Use a fume hood for chemicals and solvents that you can smell, has known toxic properties, or is unfamiliar to you.
- Record everything in your lab notebook
- Always report accidents, however minor.

Safety and Infection Control in any area of the hospital is:

- A process
- A mindset
- An attitude



No single event or an occasional decision


TEAM
Teamwork Is
The Key
To Safety!

Challenges for Laboratory Safety Program

- Impractical Policy guidelines
- Lack of Coordinated team effort
- Will to Accept and implement: reluctance
- Overcoming attitudes-Whose baby is it anyway?
- Continuous Teaching & Learning- time??
- Continuing Improvement- Complacency

Incident and injury free is up to me