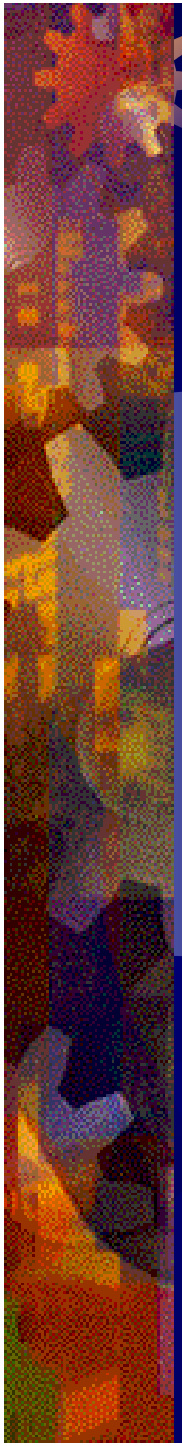

# Personal Protective Equipment: Considerations for Hazard Communication Documents

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# Today's Presentation

- We will focus on PPE selection as it pertains to GHS-compliant Safety Data Sheets (SDSs)
- Some background information, theoretical and practical considerations
- PPE by route of exposure
- We will NOT be discussing labeling requirements

# PPE – Routes of Exposure

We can really condense PPE selection down to 3 basic routes:

- inhalation;
- dermal, and;
- ocular.

Dermal can further be broken down into hand protection v. body protection. (*Note: we are not covering PPE to protect from physical hazards today).*

# Reminder: Hazard v. Risk

- SDS Authors are generally **not allowed** to assign PPE based on exposure judgments from *downstream exposure situations* (REACH Annexes on Extended SDSs are an exception).
- We are not at the user's site, so we can't accurately estimate exposure (by ANY route) – in addition to precautionary handling statements, we can only give reasonably specific *options* for PPE.

# Caveats/General Statements

- As stated in the previous slide…we cannot perform an accurate exposure assessment – the user has to do this, so…it behooves manufacturers and preparers to explicitly state this in Section 8 of their SDSs!
- Reference Regulatory bodies in the jurisdiction where your SDSs will be distributed (e.g. ANSI in U.S., EN in Europe, etc.).
- Trade Name references for specific PPE on SDSs – check with legal counsel.

# One Question…

- Why assign PPE for a given route at all, if there are no health effects?
- If SDS preparers routinely do this, do we risk ‘over-warning’, and perception fatigue by readers?
- Is ‘Good industrial hygiene practice’ sufficient justification to assign PPE, when no hazards have been identified?

# Minimum PPE for Chemical Eye Protection

- Safety Glasses with fixed sideshields:
  - Mechanical irritants (also for impact hazards)
- Indirect vented goggles:
  - Irritating solids/pastes/liquids, dusts
- Indirect Vented Goggles + Faceshield
  - Corrosive solids/pastes/liquids (generally pH <2 or >11.5, depending on buffering capacity)
- Unvented Goggles
  - Specific high-hazard materials, e.g. formaldehyde
- NOTE: Hot/cold materials/optical radiation require additional/higher PPE

*Adapted from ANSI/ISEA Z87.1 - 2015*

# PPE for Inhalation

- Two key pieces of information needed for respirator selection are:
  - Identity of airborne contaminants (we know these from the formulation) and;
  - The airborne concentration, in the user's environment (again, we generally won't know this information, but, since we don't know how the customer is using the product, we should assume that their use could generate airborne concentrations), so….
- The best we can do is provide general options based on the ingredients present in the formulation.

# Personal Protection - Respirators

- Two basic types of respirators
  - Air purifying respirator (APR)
  - Air-supplying
- Three basic facepiece configurations
  - Half facepiece
  - Full facepiece
  - Half OR full facepiece

# Air Purifying Respirators

- Can be assigned for individual components by cartridge type from manufacturers – e.g. organic vapor, acid gases, ammonia, etc.
- Remember - we lack information on how product may be used – e.g. if it has dissolved solids in a liquid media, but may become aerosolized, addition of a particulate combination or prefilter may be advised
- PAPRs (Powered Air Purifying Respirators) – offer much higher protection factors, but the need for assigning them is determined on exposure levels, which we won't know

# Air Supplying Respirators

- Necessary for components that present a concern of oxygen deficiency (e.g. propellants, other asphyxiants)
- VOCs – If the molecular weight is < 50 and boiling point is <65 C., then migration in/through the sorbent bed is likely, and exposure may occur
- Unknowns – thermal/chemical degradation products
- Example:  Spray paints with both organic solvents and propellants (asphyxiants) – consider assigning both OV and Supplied Air, let the customer choose

# Respirators – Global Issues

- Different countries have different terminology and classification schemes for respirator types
- Example:  in the U.S., NIOSH certifies different efficiency levels and oil-resistant classes for particles (e.g. N95, P100, etc.) – EU does not
- As a manufacturer or author, you will need to choose how to align (or genericize) your SDS language

# Respirator Resources

- Federal OSHA: https://www.osha.gov/SLTC/respiratoryprotection/index.html
- Manufacturers' websites (many - e.g. 3M Company, North/Honeywell, Gerson, etc.)

# PPE for Skin Protection

- PPE Material Selection for skin protection is NOT an exact science
- Most chemicals do not have published breakthrough data for glove materials (approximately 400-500 out of 60,000+ chemicals in commerce)
- Mixtures present special challenges for determining a single glove material
- Broad-spectrum gloves (e.g. polymer laminates) can help solve some of these issues, but they generally have poor dexterity and acceptance

# Glove Selection – General Considerations

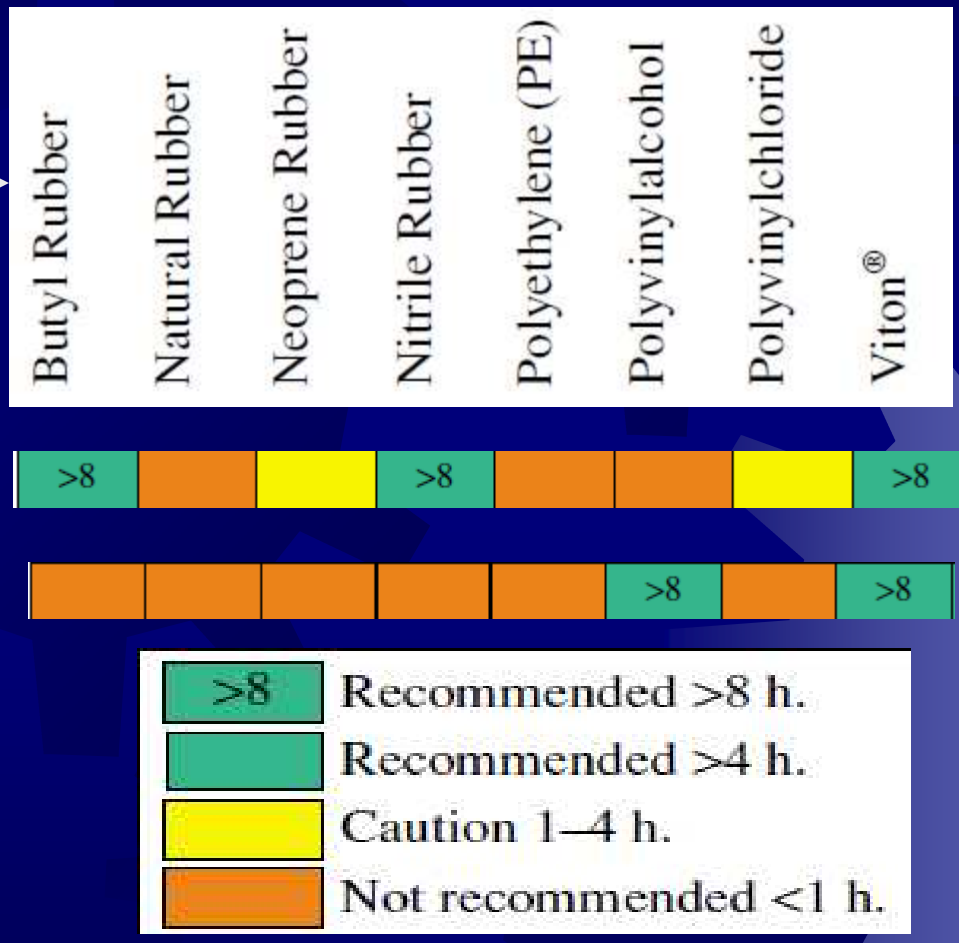
- Pure materials are the most straightforward
- Important to determine which glove types are NOT good choices (due to degradation from *any* component, even those that are non-hazardous)
- Approach any extrapolation based on similar molecular structures with care:
  - e.g. Methyl acrylate - butyl rubber is best choice
  - Methyl methacrylate – PVC and polymer laminate are best choices

# Information Resources

- Most definitive general resources are:
  - Forsberg and Mansdorf Guide
  - Trade associations (e.g. acrylates)
  - Glove manufacturer's guides (but info is specific to their glove models/materials)
- Secondary resources:
  - Gestis website (German) – use caution – not as definitive as Primary resources (above), but very useful for identifying which gloves not to recommend due to degradation

# Mixture Glove Selection Example - formaldehyde and toluene together

Forsberg & Mansdorf Guide




***Where does this leave us..??***
***THAT is the $1,000,000 question!***

# Glove Testing

- Methods include ASTM 739, EN 374 and ISO 6529
- All methods have strengths and weaknesses
- EN uses “Normalized BTT” (breakthrough time) - permeation threshold is 1 ug/(cm² x min)
- ASTM determines breakthrough time using a  permeation threshold of 0.1 ug/(cm² x min)

# Glove Testing

- Detection is easiest for:
  - volatile solvents
  - inorganic acids or alkaline solutions
- Detection is difficult for:
  - Non-volatiles
  - Poor solubility in water
  - Reactive chemicals (e.g. isocyanates)
- If a glove manufacturer does testing for you – their ‘answer’ will be one of their own glove models, and you must use care in genericizing results

# Glove Selection

- Another approach to consider is establishing a hierarchy of health endpoints, based on severity and reversibility:
  - Dermal defatting
  - Irritant
  - Skin-absorbable toxin
  - Dermal sensitizer
  - Corrosive
  - Fatality by dermal route

# Glove Selection

- Special Circumstances to consider:
  - Engineered nanoparticles
  - Potent Compounds (active pharmaceutical ingredients)
  - Product dispensing systems that are designed to reduce exposure risk
- If you mix or compound raw materials from another manufacturer, request that they conduct testing (nominal cost)

# Closing Comments

- This was a VERY brief overview – not intended as training for an SDS author to perform PPE selection.
- There is a need for improvements at the Trade Association and Regulatory Agency level, especially for dermal PPE selection.