How Well Do You Really Know Your Brewery Chemicals?

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TODAY’S DISCUSSION

PREMISE

• Focus is on Safety
• What You Know
• Coded Information
• Procedures, Equipment

INFORMATION & METHODS

• Substitution and Elimination
• Safe Work Practices
• Engineering Controls
• Administrative Controls
• Personal Protective Equipment

EXAMPLES

• Caustic / Alkaline Based Cleaners
• Carbon Dioxide
Thoughts and Actions
- Safe Work Practices (SWPs)
- Product Substitution/Elimination

Prevention & Protection

Engineering Controls (ECs)

Administrative Controls (ACs)

Personal Protective Equipment (PPE)
SUBSTITUTION, ELIMINATION AND SAFE WORK PRACTICES

THE “THOUGHTS AND ACTIONS” OF SAFETY
SUBSTITUTION AND ELIMINATION

**SUBSTITUTION – CHANGE CHEMICALS OR PROCESSES**

- Lower concentration PAA = safer oxidizer and flammable
- Acid cleaning under CO$_2$ for FV/BBT
- Lower pH solid oxidizing cleaners instead of liquid caustic
- Adding surfactant to reduce boilover

**ELIMINATION – REMOVE THE HAZARD ENTIRELY**

- Powdered DE filter aid replaced with lenticular filter or centrifuge
- Carbon monoxide eliminated with electric forklift (but hydrogen??)
SAFE WORK PRACTICES – ATTENTIONING THE HAZARDS

HOUSEKEEPING
- Keep Labels Visible
- Put Away Equipment

WALKING, WORKING AND EXITING
- Avoid Spills
- Keep Clear Pathways
- Rehearse Emergency Procedures

HYGIENE
- Wash PPE and Hands After Chemical Use
ENGINEERING CONTROLS

CONTAINING / ISOLATING / CONTROLLING HAZARDS WITH EQUIPMENT AND SYSTEMS
ENGINEERING CONTROLS

ACTIVE CONTROLS

• Machine Guarding
• Electrical Disconnects
• Ventilation Systems
• Pressure/Vacuum Relief Valves
• Foam Sensor linked to Steam Shutoff
• Hard Transfer Lines

PASSIVE CONTROLS

• Temperature and Pressure Gauges
• CO₂ Monitor
• Forklift Horn
• Secondary Containment
COMMON CLASSES OF ENGINEERING CONTROLS

**PROCESS CONTROLS**
- Brewery Process Automation
- Chemical Metering Pump

**ENCLOSURE AND ISOLATION**
- Machine Guarding
- Enclosed Chemical Transfer Lines

**VENTILATION**
- Grain Dust Exhaust
- CO₂ Exhaust Blower for Cellar Vessels
ENGINEERING CONTROLS FOR BREWERY CHEMICALS

Secondary Containment

Chemically Compatible Equipment

Ventilation and Monitoring
III

ADMINISTRATIVE CONTROLS

TRANSMITTING HAZARD INFORMATION THROUGH SIGNS, LABELS, TRAINING, EMERGENCY ALERTS, POLICIES & RULES
SAFETY DATA SHEETS (SDSs)

Essential Information on Chemical Products, Health Effects, Storage, Spill Mgmt.
Safety Data Sheet
Spartan Chemical Company, Inc.

Revision Date: 02-Jul-2018

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier
Product Name: CAUSTIC CLEANER FP
Product Number: 3189
Recommended Use: Cleaning agent
Uses Advised Against: For Industrial and Institutional Use Only
Manufacturer/Supplier: Spartan Chemical Company, Inc.
1110 Spartan Drive
Maumee, Ohio 43537 USA
800-537-8990 (Business hours)
www.spartanchemical.com

24 Hour Emergency Phone Numbers:
Medical Emergency/Information: 888-314-6171
Transportation/Spill/Leak: CHEMTREC 800-424-9300

2. HAZARDS IDENTIFICATION

GHS Classification
Skin Corrosion/Irritation: Category 1 Sub-category A
Serious Eye Damage/Eye Irritation: Category 1
Corrosive to Metals: Category 1

GHS Label Elements
Signal Word: Danger
Symbols:

Hazard Statements:
Causes severe skin burns and serious eye damage. May be corrosive to metals.

Most Comprehensive Resource on Hazards, Properties, Management Recommendations

- 16 Standard Sections
- 1st Four Sections
  - Product/Co. Info.
  - Hazards (summary)
  - Composition (ranges)
  - First Aid
- Other Sections Include
  - Storage & Disposal
  - Emergencies Mgmt.
  - PPE 💚
  - Chemical Properties
KEY SDS RECOMMENDATIONS

READ THEM
• Read SDS for All Chemicals You Use
• Request SDS When Absent
• Ask for Clarification

DOCUMENTATION
• Record SDS Training
• Refer to SDS in SOPs

KEEP UPDATED
• Binder is Updated & Complete
• Recognized Location
• Available to All
LABELS

Cliff Notes Version of the Safety Data Sheet
DANGER

Carbon Monoxide

H220: Extremely flammable gas. - H331: Toxic if inhaled. - H360D: May damage the unborn child. - H372: Causes damage to organs through prolonged or repeated exposure.

Keep container tightly closed. Avoid breathing vapours. If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a Poison Center or doctor. Store in a well-ventilated place.
## Chemical Labels Under the Global Harmonized System (GHS), since 2012

<table>
<thead>
<tr>
<th>Section</th>
<th>Information</th>
</tr>
</thead>
</table>
| **1. Signal Word** | - DANGER  
- WARNING |
| **2. GHS Pictogram** | ![GHS Pictograms](image) |
| **3. Mfr. Info.** | - Company  
- Address  
- Phone Number |
| **4. Precautionary / First Aid (P codes)** | - General Prevention  
- Response, Storage or Disposal  
- First Aid Recommendations |
| **5. Health & Safety Hazards (H codes)** | - Nature and Degree of Hazards Posed  
- Codes Tie to SDS |
| **6. Product Name / Other Identifiers** | - Product Name, Part No.  
- Major Chemical Ingredient may be Listed |
Other Helpful Label Info

“HMIS”

HAZARD INDEX
- Close to NFPA Placard System
- 0-4 Ratings

PPE RECOMMENDATIONS
- Pictograms Surpass Language Barriers
- Should Agree with SDS
- Workers Still Need Training
Standardized Key Words and Color Schemes for Particular Work Areas

SIGNS
CAUTION
Minor to Moderate Injury Potential

WARNING
Death or Serious Injury is Possible

DANGER
Death or Serious Injury Likely

Black on Yellow

Black on Orange

Black and Red on White Background
NOTICE
General Information

SAFETY
General Safety Recommendations

ELECTRICAL & FIRE SAFETY
No Standard Format

Blue Panel on White
Green Panel on White
Often Red on White
PLACARDS

Collective Hazards Posted on Buildings or Transport Vehicles
**HEALTH HAZARD**

- 4 = Can be lethal
- 3 = Can cause serious or permanent injury
- 2 = Can cause temporary incapacitation or residual injury
- 1 = Can cause significant irritation
- 0 = No hazard

**FLAMMABILITY HAZARD**

- 4 = Will vaporize and readily burn at normal temperatures
- 3 = Can be ignited under almost all ambient temperatures
- 2 = Must be heated or high ambient temperature to burn
- 1 = Must be preheated before ignition can occur
- 0 = Will not burn

**SPECIAL HAZARD**

- ALK = Alkaline
- ACID = Acidic
- COR = Corrosive
- OX = Oxidizing
- ☢ = Radioactive
- ⚡ = Reacts violently or explosively with water
- ☢️O = Reacts violently or explosively with water and oxidizing

**INSTABILITY HAZARD**

- 4 = May explode at normal temperatures and pressures
- 3 = May explode at high temperature or shock
- 2 = Violent chemical change at high temperatures or pressures
- 1 = Normally stable. High temperatures make unstable
- 0 = Stable
WORST CASE:
B. B. L. C.
DOT HAZARD CLASSES AND PLACARDS

SPECIFIC TO D.O.T. REGULATIONS

i.e. FOR CONTAINERS AND TRANSPORT VEHICLES
US DOT Hazmat Class & Division Placards
Chemical Information Review - Example for Peracetic Acid

**Safety Data Sheet**

**Product Name:** CAUSTIC CLEANER FP
**Category:** Cleaning Agent
**Packing:** Liquid
**University Use Only:** Yes

**Manufacturer:** Spartan Chemical Company, Inc.
**Address:** 2003 South State Street, Mansfield, OH 44906
**Emergency Phone Number:** 1-800-352-5632

**UN Classification:** 7, 2.1

**Hazard Statements:**
- Caution: Causes severe skin burns and serious eye damage. May be corrosive to metals.

**Precautionary Statements:**
- Use only in well-ventilated areas.
- Avoid contact with eyes, skin, and clothing.
- Do not inhale mist or vapors.
- Wear protective clothes, gloves, and eye protection.

**First Aid Measures:**
- If inhaled: Get fresh air and call a doctor.
- If on skin (not rinsed): Take off all clothing. Wash skin with soap and water. Call a doctor.
- If in eyes: Call a doctor.

**Environmental Precautions:**
- Do not pour into sewers or drains.

**Disposal:**
- Dispose of by incineration or as hazardous waste.

**Signs:**
- Wear protective clothing (face shield, gloves, apron).
- Corrosive material.

**Placards:**
- Oxidizer
- Caustic
- Reactivity
- Personal Protection
- Health
PERSONAL PROTECTIVE EQUIPMENT (PPE)

THE LAST LINE OF DEFENSE
LIMITATIONS

- NOT Failsafe
- Last Line of Defense
- Poor Understanding
  - Selection
  - Use
  - Cleaning
  - Inspection
  - Replacement

CHEMICAL PPE CAN PROTECT

- Eyes / Face
- Hands
- Feet
- Other Parts
- Lungs

PPE
EYE PROTECTION

FROM SPLASHES

- Standard Safety Glasses
- Indirect Vented Goggles
- Face Shield
HAND PROTECTION

FROM DIRECT CONTACT

- Inexpensive disposable nitrile
- Neoprene hybrid over woven or latex base
- Heavy duty reusable nitrile

Nitrile Disposable
Low hazard use

Neoprene Hybrid
Mod hazard use

Heavy Nitrile
Acids, Bases, Sanitizers
Mod/High hazard use
FOOT PROTECTION

FROM SPILLS, PUDDLES, CONTAINER WEIGHT

- Sturdy leather or synthetic work shoes/boots with reinforced toe and shank
- Knee-high rubber (PVC) with reinforced toe and shank
- Low-rise rubber (PVC) with reinforced toe and shank or rubber pullover over sturdy work boot
OTHER PROTECTION

VARIOUS HAZARDS

- Splash protection apron
- Fall protection harness, lanyard, and anchoring
- Hearing protection, disposable or reusable
RESPIRATORY PROTECTION

FROM DUSTS, MISTS, VAPORS, AEROSOLS

• Chemical Mists/Vapors
  • Brewery Washdown
  • Paints, Coatings, Solvents

• Particulate protection
  • Grain Dust
  • DE Filter Aids
  • Metal, Wood, Plastic Fabrication/Welding

None of These Work in the Absence of Sufficient Oxygen!!
TOTAL MINDSET FOR PREVENTION AND PROTECTION AROUND CHEMICALS

1. SWP
2. E C
3. A C
4. P P E

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SOME EXAMPLES

MORE INFORMATION AVAILABLE IN YOUR SDS BINDER
CHEMICALS IN BREWERIES/PUBS

1. CORROSIVES
   - Acid Cleaners
   - Caustic Cleaners
   - Alkaline Powders

2. OXIDIZERS
   - Hydrogen Peroxide
   - Peracetic Acid
   - Nitric Acid / Iodine
   - Ozone
   - Chlorine Dioxide

3. OTHER BEER PRODUCTION
   - Non-Oxidizing Sanitizers (Quats)
   - Glycol Coolant
   - Lab Reagents
   - Water Treatment
   - Filter Aids
   - Glues
ASPHYXIANTS
• SIMPLE
  • Carbon Dioxide
  • Nitrogen
• CHEMICAL
  • Carbon Monoxide
• OXYGEN
  • Ambient: 20.9%
  • Deficient: <19.5%
  • Enriched: >23%

FLAMMABLES
• Alcohols
• Propane
• Natural Gas

FACILITIES CHEMICALS
• Lubricants
• Paints
• Janitorial
• Pest Control
• Food Service
EXAMPLE 1 – CAUSTIC / ALKALINE CLEANER

STOCK SOLUTION
- DANGER
- pH: 12.8 - >14

WORKING SOLUTION
- DANGER
- pH: 12 - 14

SUBSTITUTION with ALKALINE SOLID
- DANGER
- pH: 11.0 - 11.5
### EXAMPLE 2 – CARBON DIOXIDE

<table>
<thead>
<tr>
<th>Pure CO₂</th>
<th>Properties (from the SDS)</th>
<th>Concentrations to Consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>• WARNING &lt;br&gt; • DOT HC 2.2</td>
<td>• COLORLESS &lt;br&gt; • ODORLESS &lt;br&gt; • POOR WARNING &lt;br&gt; • VAPOR DENSITY 1.53 (air=1.00)</td>
<td>• AMBIENT AIR 400 ppm (0.04%) &lt;br&gt; • PEL/TLV TWA 5,000 ppm (0.5%) &lt;br&gt; • FIRST SYMPTOMS 15,000 ppm (1.5%) &lt;br&gt; • IDLH 40,000 ppm (4%) &lt;br&gt; • UNCON. / DEATH 80,000 ppm (8%)</td>
</tr>
</tbody>
</table>

**EXAMPLE 2 – CARBON DIOXIDE**

**Properties (from the SDS):**
- Colorless
- Odorless
- Poor warning
- Vapor density: 1.53 (air=1.00)

**Concentrations to Consider:**
- Ambient air: 400 ppm (0.04%)
- PEL/TLV TWA: 5,000 ppm (0.5%)
- First symptoms: 15,000 ppm (1.5%)
- IDLH: 40,000 ppm (4%)
- Unconsciousness / Death: 80,000 ppm (8%)
High Concentrations Local to Release Source or Cloud Development Scenario

5M is a Maximum Detection Distance and Will be Affected by Topography. Gas Levels Will Drop as Distance to Leak Source Increases Requiring Lower Alarm Set Points.

For this CO2 Example use Detectors in the Life Safety Zone to Trigger Ventilation and Evacuation Alarms.

This Example Illustrating A CO2 Gas Release From A Storage Cylinder, Typical Scenario, Broken or Blown off Hose, Regulator Incorrectly Connected, Ruptured Gauge or Similar.

For this CO2 Example Expect Higher Concentrations at Low Levels. Use for Ventilation Trigger and Pre-Alarms.

Heavier Than Air Gases Can Show a Gradient in Room Levels With Higher Concentrations at Floor Level or Slow Leak Scenario.

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EXAMPLE 3 – CARBON DIOXIDE – POINTS OF EXPOSURE
SUMMARY
Now, How Well Do You Really Know Your Brewery Chemicals?

Chemical Safety Information is All Around Us
- Often is Coded
- May be Absent or Damaged
- May be Wrong

SDSs, Labels, Signs, Placards
- Up to Date
- Visible
- Correct for Situation

Controls and PPE
- Appropriate
- In Good Repair
- Used Correctly
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