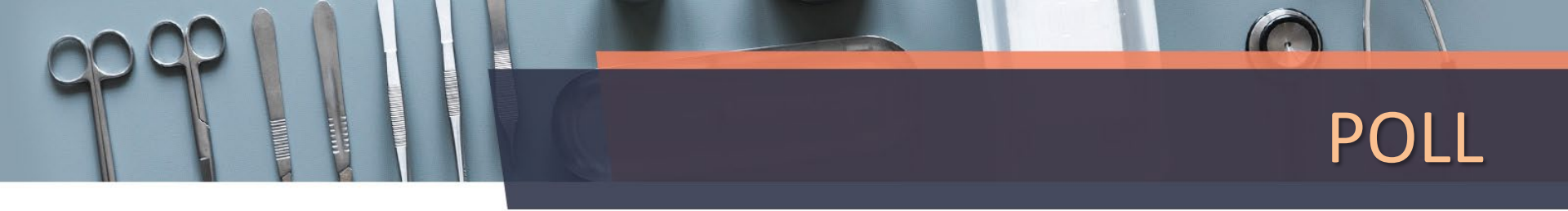
Hazardous Wastes at Medical Facilities

Arleen Gurfield, Supervising EHS

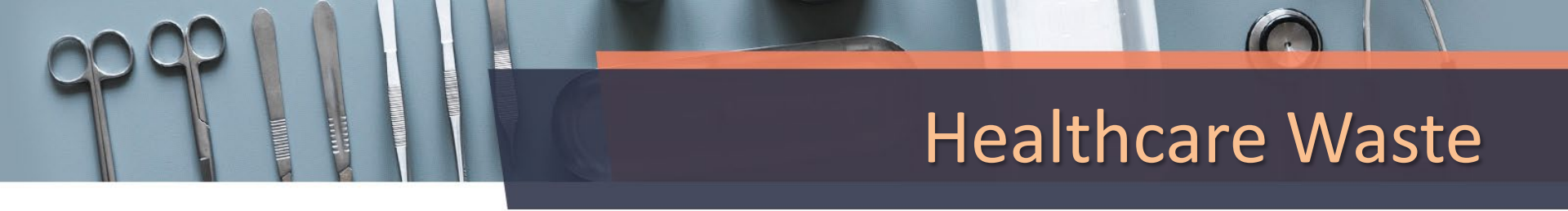
San Diego County CUPA



POLL

Question #1: Where are you from?

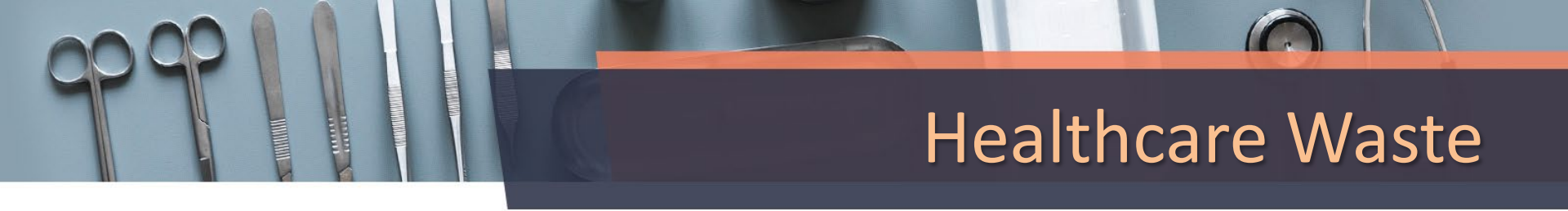
- CUPA
- Other Regulator
- Consultant
- Healthcare Facility
- Other Industry



Healthcare Waste

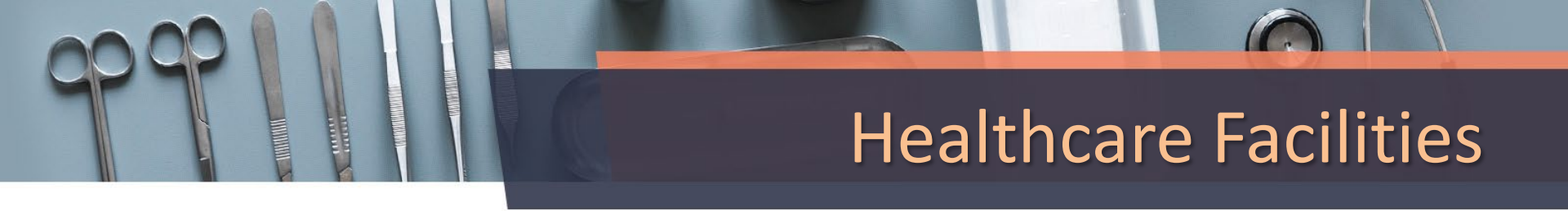
- Key Facts from World Health Organization (8 Feb 2018)

  - ✓ Of the total amount of waste generated by health care activities, about 85% is general, non-hazardous waste.
  - ✓ **The remaining 15% is considered hazardous material that may be infectious, toxic or radioactive**.
  - ✓ High-income countries (such as the US) generate on average up to 0.5 kg of hazardous waste per hospital bed per day



Healthcare Waste

"Measures to ensure the safe and environmentally sound management of health care wastes can prevent adverse health and environmental impacts from such waste including the unintended release of chemical or biological hazards, including drug-resistant microorganisms, into the environment thus protecting the health of patients, health workers, and the general public."



Healthcare Facilities

- Hospitals
- Medical Schools and Universities
- Outpatient Surgery Centers
- Diagnostic Testing Laboratories (human, animal, plant)
- Research Facilities
- Specialty Medical Clinics (e.g. Oncology Centers, Dialysis Clinics)
- Veterinary Hospitals and Clinics
- Mortuary and Autopsy Facilities
- Blood banks and collection services
- Nursing homes and Assisted-Living centers
- Ambulance Services

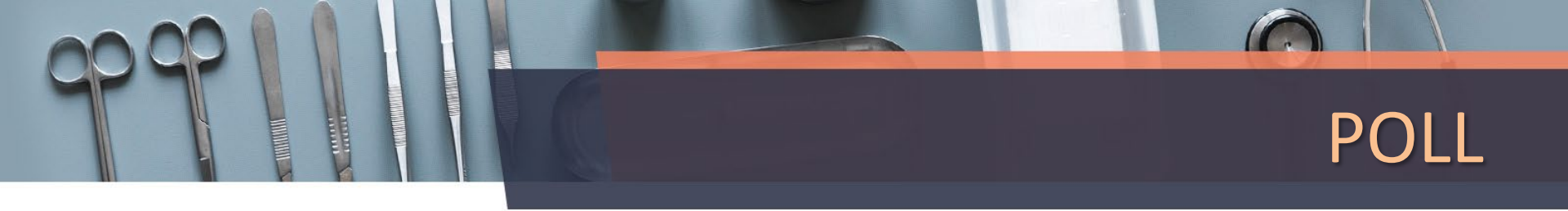
Hazardous Waste Characteristics

- Ignitable: Flashpoint <140^{o}F

- Corrosive: pH <2 or pH >12.5

- Reactive

- Toxic: RCRA and/or CA



POLL

Question #2: What kinds of hazardous wastes have you seen a healthcare facility?

Hazardous Wastes - Ignitable

- Diagnostic staining waste
- Surgical prep
- Hand sanitizers

Hazardous Wastes - Corrosives

- Equipment sterilization solutions
  - Peracetic Acid pH ~1.2
  - Rapicide Part A pH ~0.8
- Carbon Dioxide Absorber
  - ‘Sodasorb’
  - ‘Carbolime’
  - ‘Soda lime’

Hazardous Wastes - Reactives

- Equipment sterilization solutions
  - According to the FDA: Medical devices are sterilized in a variety of ways including using moist heat (steam), dry heat, radiation, **ethylene oxide gas**, **vaporized hydrogen peroxide**, **chlorine dioxide gas**, **vaporized peracetic acid**, and **nitrogen dioxide**. Most of these solutions are oxidizers and reactive
  - Peracetic Acid (also corrosive)

Hazardous Wastes - Toxics

- Diagnostic staining waste
- Surgical prep
- RCRA pharmaceuticals
- Formaldehyde and related solutions
- Hospital incinerators

WHERE TO LOOK

HINT: Hiding in the machines

DIAGNOSTIC LABORATORY

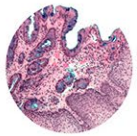
- Staining slides for light microscopy are an important part of differentiating and identifying **bacteria** or **cellular morphology**; this is typically done on glass slides
- Some staining processes have been around for over 100 years, long before RCRA, and are still used today
- Nowadays, many staining procedures are done in machines

Staining

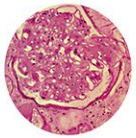
Amyloid

Congo Red
Cat # 24614

Carbohydrates



Alcian Blue/ PAS
Cat # 25086



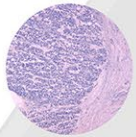
PAS
Cat # 24200

Rapid Mucin
Cat # 24208

Neuronal Tissue

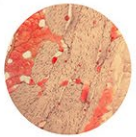
Cresyl Violet
Cat # 21063

Bielschowsky
Cat # 25994



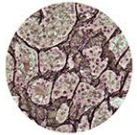
Luxol® Fast Blue
Cat # 24611

Triglycerides & Lipids

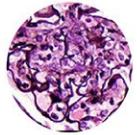


Oil Red O
Cat # 25962

Reticulin Fibers



Reticulin
Cat # 25094

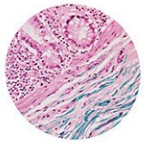


Jones PAS-M
Cat # 25091

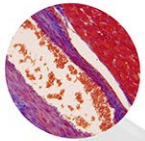
Connective Muscle Tissue

Picrosirius Red
Cat # 24901

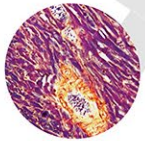
Verhoeff Van Gieson
Cat # 25089



Gomori's Trichrome
Cat # 24205

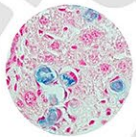


Masson's Trichrome
Cat # 25088

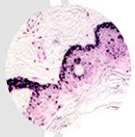


Rapid PTAH
Cat # 25715

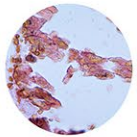
Pigment, Minerals & Granules



Prussian Blue Iron
Cat # 24199



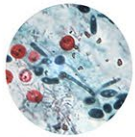
Fontana Masson
Cat # 25104



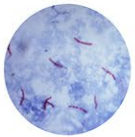
Von Kossa Method
Cat # 24633

Villanueva Osteochrome Bone
Cat # 16280

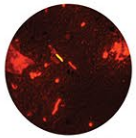
Microorganisms



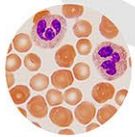
AFB Kinyuon
Cat # 25765



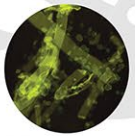
AFB Ziehl-Neelson
Cat # 24669



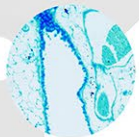
Auramine O
Cat # 24665



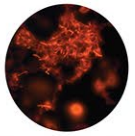
Differential Quik
Cat # 24606



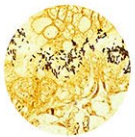
Fungi-Fluor®
Cat # 17442



Grocott Methenamine Silver
Cat # 25462

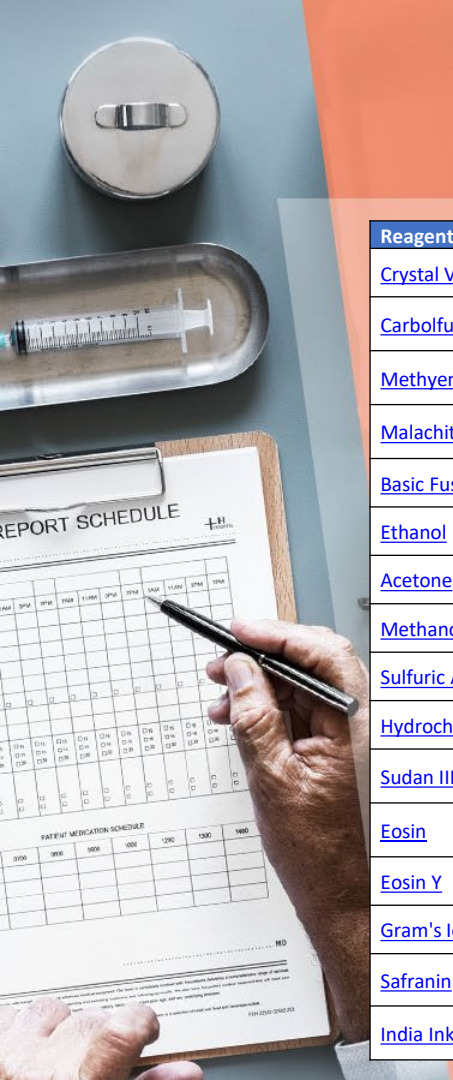


TB Fluorostain
Cat # 22422



Warthin-Starry
Cat # 25093

Gram's Stain
Cat # 24668

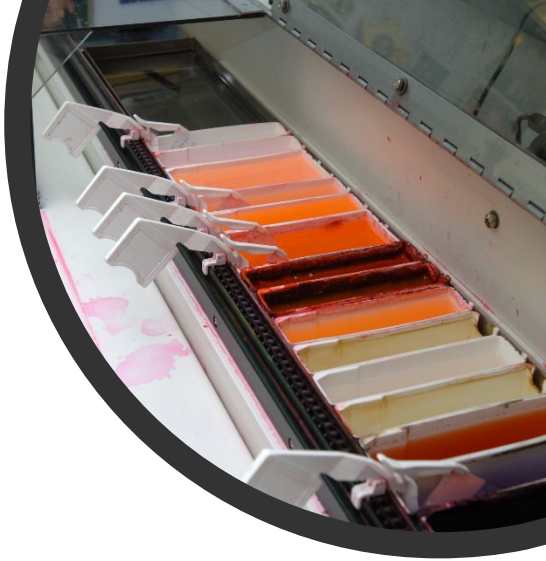


Common Micro Staining Reagents

Reagent	Staining Procedures	Ignitable	Corrosive	Toxic	Notes
Crystal Violet	Gram Stain; Fingerprint analysis			Fish LC50 = 0.24 - 5 mg/L (48-hours)	liquid or solid
Carbolfushin	Acid-Fast Stain	118°F		Phenol: Fish LC50 = 14-25 mg/L (48 hrs)	Prevent from reaching drains, sewer, or waterway
Methyene Blue	Bacteria morphology; Acid-Fast Stain	<140°F			
Malachite Green	Endospore Stain	113°F		Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.	
Basic Fuschin	Flagella Stain	118°F		Basic Fuchsin: Fish LC50 = 4.3 mg/L (48-hours)	contains methanol and phenol
Ethanol	Gram Stain; Acid-Fast	57°F		U154, U161, U112, U220	May contain listed wastes
Acetone	Gram Stain; Acid-Fast	-4°F		Fish LC50 = 5,540 mg/L (96-hours); U002	
Methanol	Wright Staining	54°F		U154	May contain listed wastes
Sulfuric Acid	Acid-Fast Stain		<1		
Hydrochloric Acid	Acid-Fast Stain		<1		
Sudan III		54°F		"Do not flush to sewer"; Fish LC50 = 9,640 mg/L	liquid or solid; Liquid may contain isopropanol
Eosin		62°F		U154; "Contains substances that are toxic to aquatic organisms"	May contain listed wastes
Eosin Y				"Avoid release to the environment"	
Gram's Iodine	Gram Stain			Gram's Iodine: Fish EC50 = 63.06 mg/L	toxicity varies based on SDS
Safranin	Gram Stain; Endospore Stain			Prevent from reaching drains, sewer, or waterway	toxicity varies based on SDS
India Ink	Capsule Stain			"contains a substance with is very toxic to aquatic organisms"	

Common Histology Staining Reagents

Reagent	Staining Procedures	Ignitable	Corrosive	Toxic	Notes
Hematoxylin Eosin	standard tissue stain	59°F			Do not allow product to reach sewage system or open water
Congo Red	Amyloid			Toxicity to daphnia static test LC50 - Daphnia magna (Water flea) - 4 mg/l - 48 h	
Rapid PTAH	Connective Muscle Tissue				Do not dispose of in drains, check with your local waste authorities
Alcian Blue (contains Copper)	Carbohydrates			Avoid release to the environment. Do not flush into surface water or sanitary sewer system.	
Periodic Acid Schiff (PAS)	Carbohydrates		1.5-2	Acute LC50 0.16 mg/l Fresh water fish	multiple components
Fontana Masson (contains Silver)	Minerals and Granules			Very toxic to aquatic life with long lasting effects. 0.0012 mg/l - 96 h Fathead minnow	May intensify fire; oxidizer. May be corrosive to metals. Causes severe skin burns and eye damage.
Von Kossa Stain (contains Silver)	Minerals and Granules			Very toxic to aquatic life with long lasting effects.	
Verhoeff Van Gieson	Connective Muscle Tissue	59°F		12.0 - 16.0mg/L - LC50- 96 h Rainbow trout	ethanol, isopropanol, and methanol
Reticulin (contains Silver)	Reticulin Fibers			0.006 mg/l- 96h - LC50- 96 h Rainbow trout	
Jones PAS (contains Silver)	Reticulin Fibers	59°F	1.7-1.9	33.9 mg/l - 96 h, Fathead minnow	multiple components
Grocott Methenamine (contains Silver)	Silver Stain			Very toxic to aquatic life with long lasting effects.	
Fast Blue	Neural Tissue				Do not allow spills to enter drains or waterways.
Masson's Trichome	Connective Muscle Tissue		2		
Rapid Mucin	Carbohydrates			Avoid release to the environment. Do not flush into surface water or sanitary sewer system.	Contains Copper



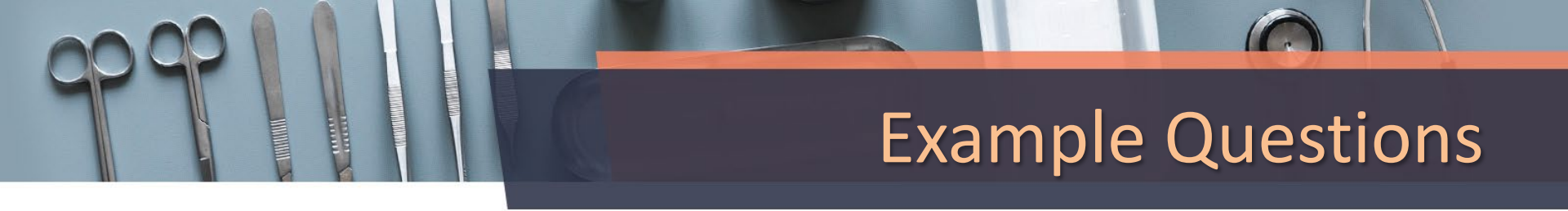
Staining Equipment

Manual Staining

Automated Staining

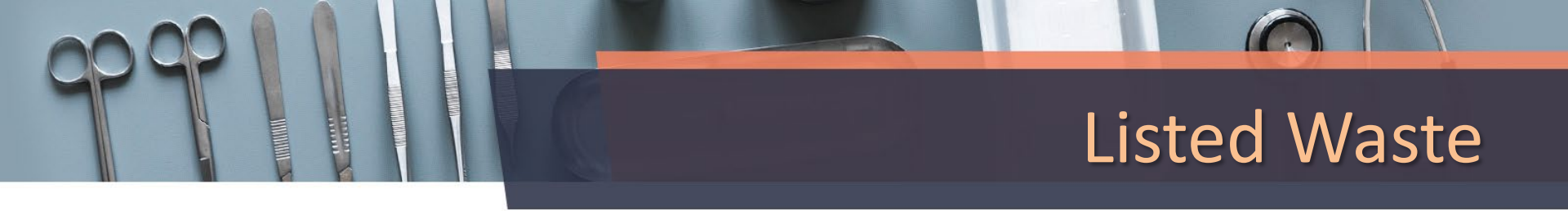
POLL

Question #3: What questions would you ask the operator?



Example Questions

- What is your staining process?
- When do you change out the reagents?
- How and where do you **dispose** of the reagents when you change them out?
- What is the volume of the container?
- May I have a copy of the **SDS(s)**?
- May I have a copy of your protocol(s)?
- Do you have other locations?



Listed Waste

§261.32 Hazardous Waste from non-specific sources

- F003: The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures(I)*

Safety Data Sheet
acc. to OSHA HCS

Date Prepared: 03/26/2014 *Reviewed On: 03/26/2014*

1 Identification

· **Product Identifier**
· **Product Name:** Gram Crystal Violet (Gram Stain Set w/Stabilized Iodine)
· **Catalog Number:** 212539
· **Relevant identified uses of the substance or mixture and uses advised against**
No further relevant information available.
· **Application of the substance / the mixture** In-vitro Diagnostics

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
BD Diagnostic Systems
7 Loveton Circle
Sparks, MD 21152
Telephone: (410) 771 - 0100 or (800) 638 – 8663
Email Address: Technical_Services@bd.com
· **Information Department:** Technical Service
· **Emergency telephone number:**
In case of a chemical emergency, spill, fire, exposure, or accident, contact BD Diagnostic Systems (410) 771-0100 or (800)-638-8663, or ChemTrec at (800) 424-9300.

2 Hazard(s) identification

· **Classification of the substance or mixture**

GHS07

Acute Tox. 4 H332 Harmful if inhaled.

Aquatic Chronic 3 H412 Harmful to aquatic life with long lasting effects.

· **Classification according to Directive 67/548/EEC or Directive 1999/45/EC**
Xn; Harmful

R20-48: Harmful by inhalation. Danger of serious damage to health by prolonged exposure.

R52/53: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

· **Classification system:**
The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.

· **Label elements**
· **GHS label elements**
The product is classified and labeled according to the Globally Harmonized System (GHS).

(Contd. on page 2)

Safety Data Sheet
according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 11.19.2014

Hematoxylin, 1% Stain

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : Hematoxylin, 1% Stain

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: S25757

Recommended uses of the product and restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific, Inc
9 Barnhart Drive, Hanover, PA 17331
(717) 632-1291

Supplier Details:

Fisher Science Education
6771 Silver Crest Road, Nazareth, PA 18064
(724)517-1954

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:

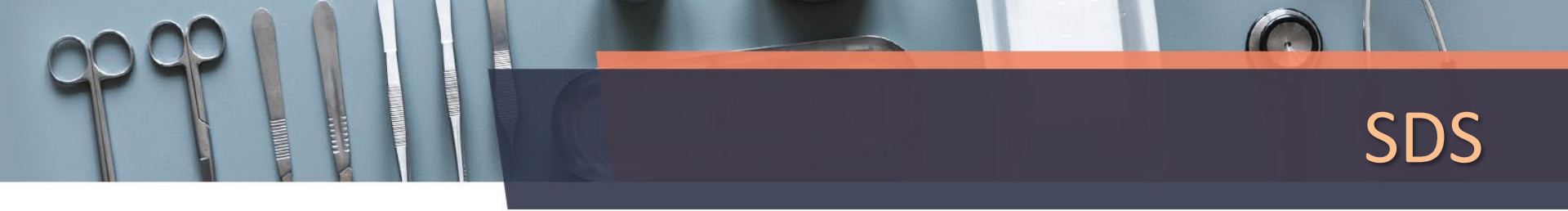
Flammable
Flammable liquids, category 2

Toxic
Acute toxicity (oral, dermal, inhalation), category 3

Health hazard
Reproductive toxicity, category 2
Specific target organ toxicity following repeated exposure, category 2

Irritant
Specific target organ toxicity following single exposure, category 3

Narcotic effects
Flammable Liquid 2
Acute Toxicity 3 (oral)
Specific Target Organ Toxicity, Single Exposure 3



SDS

- Section 3: Composition/information on ingredients
  - Concentration matters

Ingredients:		
CAS 7681-11-0	Potassium Iodide	3.05 %
CAS 7732-18-5	DI Water	95.1 %
CAS 7553-56-2	Iodine	1.85 %
		Percentages are by weight

- Section 11: Toxicity Information
  - Compare with the % concentration from Section 3

Acute Toxicity:

Oral:

POTASSIUM IODIDE (7681-11-0) LD50 Rat: 285 mg/kg

Iodine LD50 oral-rat: 14 g/kg

- Section 12: Ecological Information

Ecotoxicity:

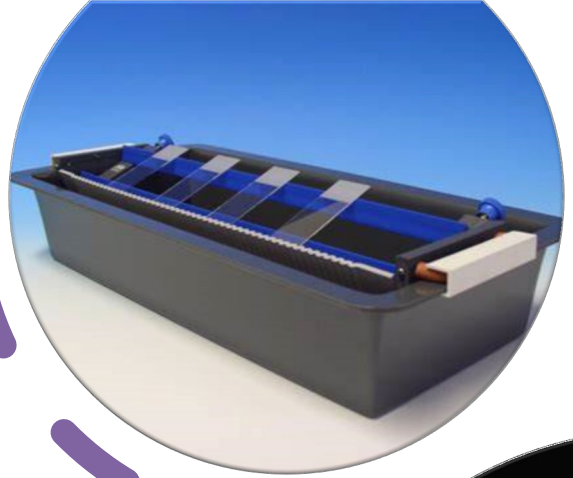
Crustacea LC50 Zebra mussel (Dreissena polymorpha) 220 - 313 mg/l, 24 hours: 7681-11-0

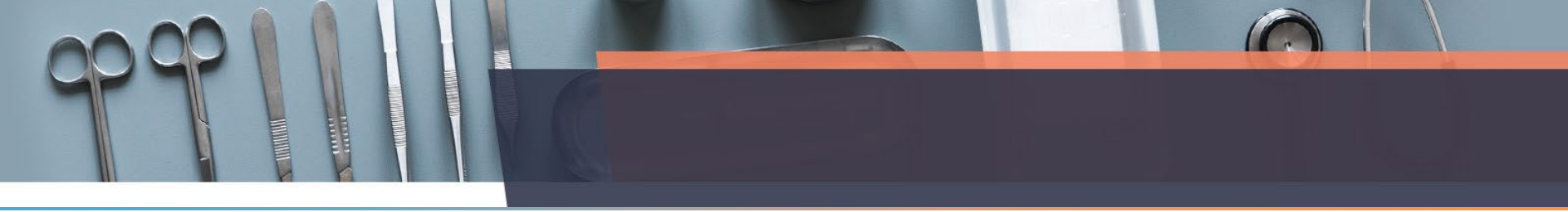
Fish LC50 - Oncorhynchus mykiss (rainbow trout) - 2,190 mg/l - 96 h: 7681-11-0

What to Look For:

- If they are doing it **RIGHT**:
  - In a fume hood
  - With slide trays
  - Properly labeled solvent waste container close by

- If they are doing it **WRONG**:
  - Staining in the lab sink
  - Slide trays over the sink
  - Waste bottles by the sink





Observed facility lab technician demonstrate a gram staining procedure.

About 50 stains per month are performed (Per EH&S)

Collected samples from reagents falling off the slide.

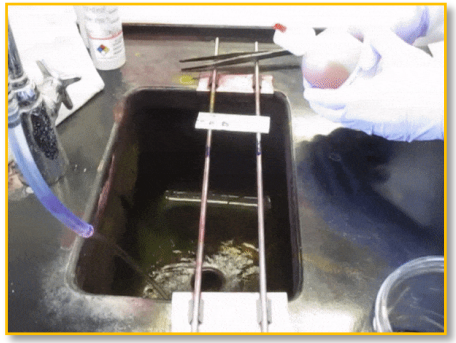
Prior to rinsing with water

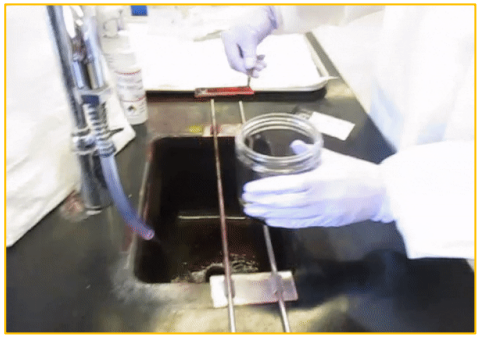
Lab technician stained two slides.

Generated about 20mL of waste reagents

Sample results indicated the reagents are **hazardous**

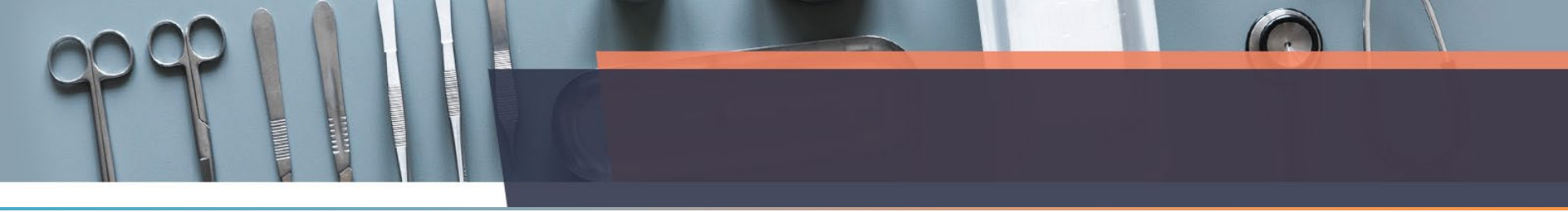
FP=77.7 Degrees F [<140F]
LC50=67.9mg/L [<500 mg/L]





The results indicated that the waste was characteristic for **ignitability** and **toxicity**.

Facility was cited for failing to conduct a proper waste determination and other hazardous waste generator violations.



This lab receives 80-90% of all gram stain samples for Sharp.

100-150 slides are processed per day (Per EH&S)

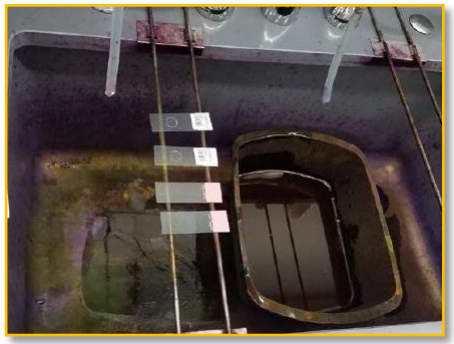
Collected samples from reagents falling off the slide.

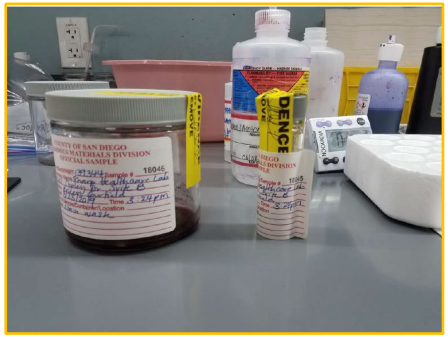
Prior to mixing with water

Lab technician stained four slides.

Sample results indicated the reagents are **hazardous**

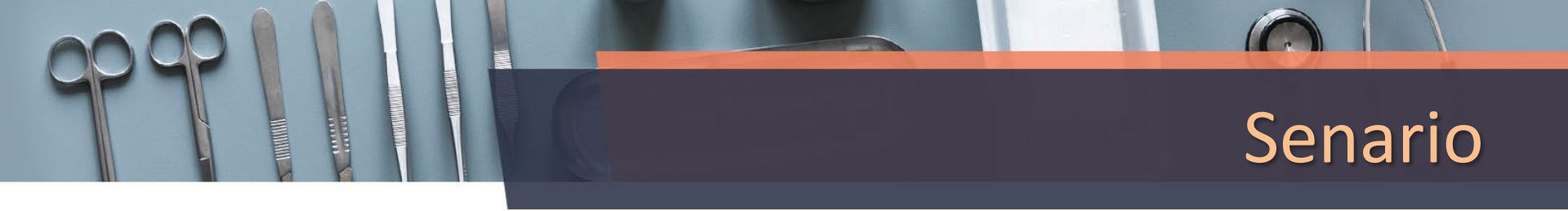
FP=114.1 Degrees F [<140F]





The results indicated that the waste was characteristic for **ignitability**.

Facility was cited for failing to conduct a proper waste determination and other hazardous waste generator violations.



Senario

- Hospital “A” Estimation:
  - Completes about 2 stains per day or about 50 slides per month.
  - This equates to about 10mL x50 slides =500mL or 0.5L of toxic and flammable hazardous waste illegally disposed in the sink per month.

- Hospitals “B, C, and D”:
  - Generates approximately 0.5L of toxic and ignitable hazardous waste per month at each hospital. Total of 1.5 L per month

- Lab “A”:
  - Director of Lab, stated that about 100-150 slides are processed per day.
  - Approximately generating (125 slides*20 workdays per month) = 2,500 slides/month or 2,500*10mL = 25,000mL or 25L of toxic and ignitable hazardous per month.

- It is estimated that this healthcare system was illegally disposing approximately 27 L of hazardous waste per month continuously since April 2005. If volume of slides that need gram staining did not change since 2005, then the total volume of hazardous waste illegally disposed in sink is estimated around 4,644 L or **1,226 gallons**.

Best Management Practice (BMP)

Option 1:

- Collect all lab staining and rinsate waste in a tray
- Empty the collection tray after every use into a properly managed hazardous waste container, suitable for flammable and toxic wastes.

Option 2:

- Collect staining waste and rinsate waste separately
- Empty the staining waste collection tray after every use into a properly managed hazardous waste container, suitable for flammable and toxic wastes.
- Rinsate waste can be tested and potentially disposed as non-hazardous if not characteristic for hazardous waste
  - Ignitability, Corrosivity, Reactivity, and Toxicity

County of San Diego

DEPARTMENT OF ENVIRONMENTAL HEALTH AND QUALITY
HAZARDOUS MATERIALS DIVISION
P.O. BOX 129261, SAN DIEGO, CA 92112-9261
Phone: (858) 505-6700 or (800) 253-9933 Fax: (858) 505-6786
www.sdcdehq.org

Staining Waste Guidance

Many human and animal healthcare facilities in San Diego County conduct microbiological staining for patient diagnosis or research. Several of the reagents used in these processes may be classified as hazardous waste and must be managed pursuant to State and Federal regulations. The purpose of this document is to provide guidance on the proper identification, management, disposal, and permitting of staining wastes that are classified as hazardous waste.

BACKGROUND

Microbiological staining is an important technique used to better visualize cells, including bacteria and cellular components. Common facilities that conduct staining are hospitals, medical clinics, veterinary clinics and hospitals, diagnostic and histopathology laboratories, and research laboratories such as those found at universities and the biotech industry.

HOW TO DETERMINE IF WASTE IS HAZARDOUS

- Review the chemical description on the reagent label and the Safety Data Sheet
- Pay special attention if you see:
  - ✓ The signal words: "DANGER" or "WARNING"
  - ✓ Any pictogram indicating a chemical hazard, such as a flame for flammables or an exclamation mark for skin sensitizers. See pictograms to the left

The reagents used in staining procedures *must* be managed as a hazardous waste if any of the following characteristics apply:

- **Ignitable**: flashpoint < 140°F or 60°C
- **Corrosive**: pH ≤2 or ≥12.5
- **Toxic**: defined in the California Code of Regulations §66261.24. See Table 1.1 for examples.
- **Reactive**: Reactive wastes are unstable under normal conditions; or can cause explosions or release toxic fumes, gases, or vapors when heated, compressed, or mixed with water.

See additional guidance on conducting hazardous waste determination

Table 1.1 Hazard Characteristics for Common Staining Reagents

Reagent	Possible Methods	Ignitable	Corrosive	Toxic	Notes
Diff Quick Fixative	veterinary cytology	X		X	Flammable and toxic
Crystal Violet	microbiology; fingerprint analysis			X	Very toxic to aquatic life; long-lasting effect to environment
Eosin Y	histology	X		X	Toxic to aquatic life
Coomassie Blue	gel electrophoresis			X	Toxic to aquatic life
Ethidium Bromide	gel electrophoresis			X	Acutely toxic
Iodine	microbiology			X	Very toxic to aquatic life
Malachite Green	microbiology			X	Toxic to aquatic life; long-lasting effect to environment
Methylene Blue	various			X	Toxic to aquatic life
Ethanol	various	X			
Isopropanol	various	X			
Methanol	various	X			
Acetone	various	X			
Sulfuric Acid	various		X		
Hydrochloric Acid	various		X		

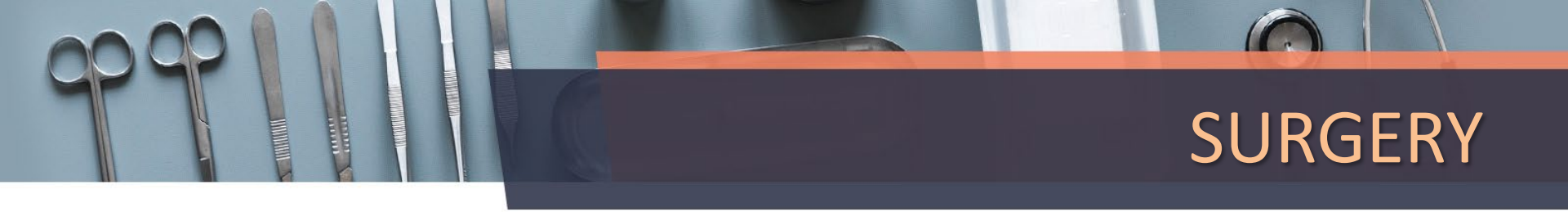
HELPFUL WEBSITES:

- Gyure, Ruth A. 2010. An Eco-friendly, Scaled-down Gram Stain Protocol. *J. Microbiol Biol Educ*, volume 11(1). Pages 60-61. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3577235/
- Conducting Waste Determinations:
  - https://www.sandiegocounty.gov/content/sdc/deh/hazmat/hazwaste/hazwastedetermination.html
  - https://dtsc.ca.gov/defining-hazardous-waste/
- List of Local Certified Labs for Hazardous Waste Testing:
  - https://waterboards.maps.arcgis.com/apps/webappviewer/index.html?id=bd0bd8b42b1944058244337bd2a4ebfa
- HMD Permit Application: https://www.sandiegocounty.gov/content/dam/sdc/deh/hmd/pdf/HMF-1000%20CERS%20Application%20Form%20(07-21).pdf
- EPA ID Number Application: https://dtsc.ca.gov/apply-for-hazardous-waste-epa-id-number/
- County of San Diego Hazardous Materials Division website: https://www.sandiegocounty.gov/content/sdc/deh/hazmat.html
- State of California – Department of Toxic Substances Control – Hazardous Waste Management: https://dtsc.ca.gov/managing-hazardous-waste/
- California Hazardous Waste Regulations: http://www.dtsc.ca.gov/LawsRegsPolicies/Title22/index.cfm

https://www.sandiegocounty.gov/content/dam/sdc/deh/hmd/pdf/HMG-3023%20(10-22)%20-%20Staining%20Waste%20Guidance.pdf

WHERE TO LOOK

SURGERY



SURGERY

Sterile Prep Solutions

- Chlorhexidine

Water hazard class 2 (Self-assessment): hazardous for water
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
Also poisonous for fish and plankton in water bodies.

- Alcohol

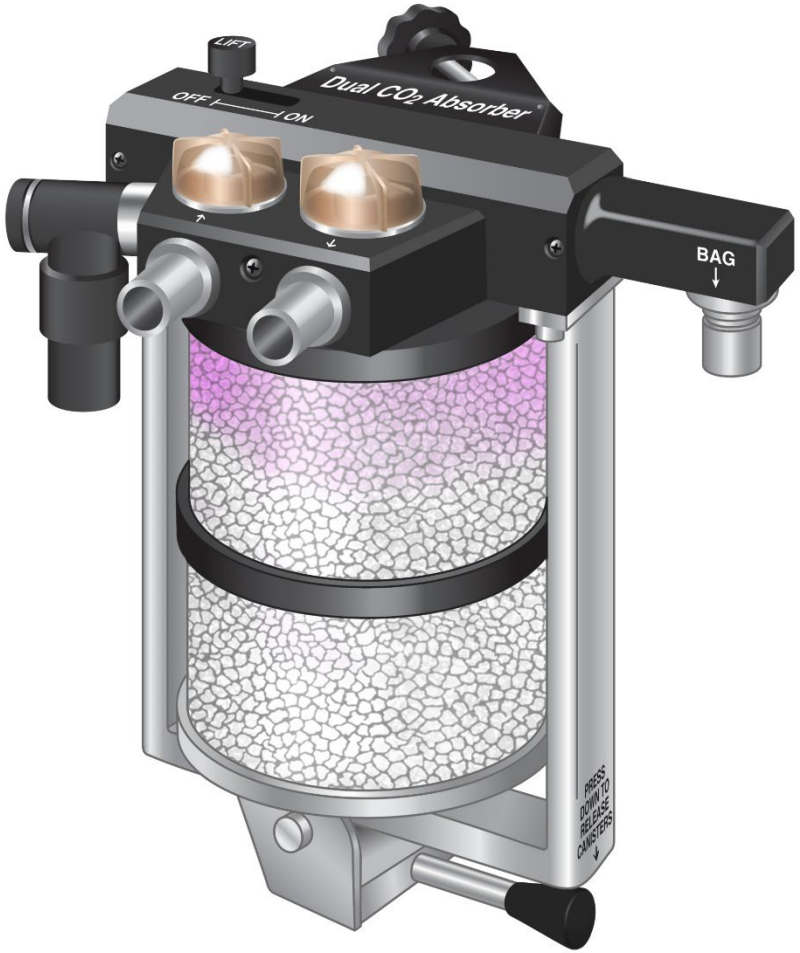
Table.

Association of Sterile Prep Solution With Infection

Sterile Prep Solution	Total Cases Using Solution, No.	Signs and Symptoms of Infection, No.
Chlorhexidine	6559	4
Povidone iodine	4438	19
Chlorhexidine and povidone	2475	1
Alcohol	2326	3
Techni-Care surgical scrub	1661	0

SURGERY

- Every facility that performs **general anesthesia** will have an anesthesia machine
- These machines will have a carbon dioxide **(CO_2) absorber**



CO_2 Absorbers

- Used to absorb carbon dioxide (acidic) exhaled by the patient under general anesthesia
- Made of **$CaOH_2$, NaOH, KOH and/or $BaOH_2$** (basic).
- Absorbers typically include a pH sensitive dye that changes to a blue-violet color when granules are saturated with CO_2.

SAFETY DATA SHEET

Soda lime, granular, with indicator **Revision Date** 17-Dec-2020

Health hazards

Skin Corrosion/Irritation	Category 1 B (H314)
Serious Eye Damage/Eye Irritation	Category 1 (H318)

Environmental hazards
Based on available data, the classification criteria are not met

Full text of Hazard Statements: see section 16

2.2. Label elements

Signal Word **Danger**

Hazard Statements
H314 - Causes severe skin burns and eye damage

Precautionary Statements
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P301 + P330 + P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician
P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower

2.3. Other hazards

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures

Component	CAS-No	EC-No.	Weight %	CLP Classification - Regulation (EC) No 1272/2008
Soda lime	8006-28-8		-	Skin Corr. 1B (H314) Eye Dam. 1 (H318)
Calcium hydroxide	1305-62-0	215-137-3	75 - 85	Eye Dam. 1 (H318) Skin Irrit. 2 (H315) STOT SE 3 (H335)
Sodium hydroxide	1310-73-2	EEC No. 215-185-5	< 4	Met. Corr. 1 (H290) Skin Corr. 1A (H314) Eye Dam. 1 (H318)
Ethanaminium, N-[4-[bis[4-(diethylamino)phenyl]methylene] -2,5-cyclohexadien-1-ylidene]-N-ethyl-,	2390-59-2	EEC No. 219-231-5	<1	-

(a) acute toxicity;

Oral	Based on available data, the classification criteria are not met
Dermal	Based on available data, the classification criteria are not met
Inhalation	Based on available data, the classification criteria are not met

Toxicology data for the components

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Calcium hydroxide	LD50 = 7340 mg/kg (Rat)	-	-
Sodium hydroxide	140 - 340 mg/kg (Rat)	1350 mg/kg (Rabbit)	-
Water	-	-	-

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

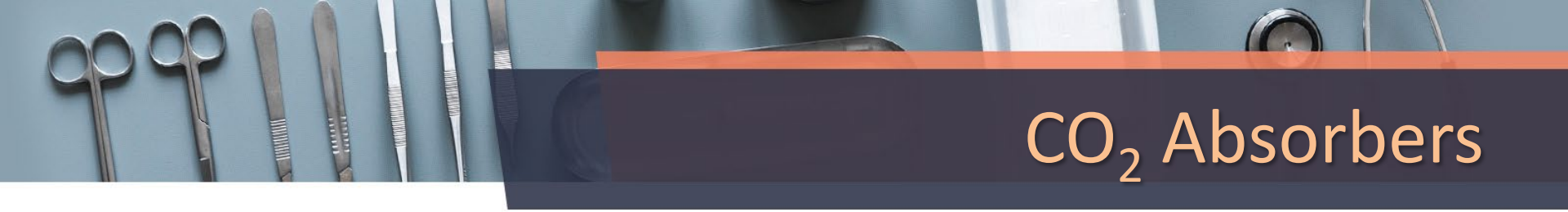
9.1. Information on basic physical and chemical properties

Physical State	Solid	
Appearance	White - Light grey	
Odor	Odorless	
Odor Threshold	No data available	
Melting Point/Range	No data available	
Softening Point	No data available	
Boiling Point/Range	No information available	
Flammability (liquid)	Not applicable	Solid
Flammability (solid,gas)	No information available	
Explosion Limits	No data available	
Flash Point	Not applicable	**Method -** No information available
Autoignition Temperature	No data available	
Decomposition Temperature	No data available	
pH	12 - 14	Alkaline
Viscosity	Not applicable	Solid
Water Solubility	Slightly soluble	
Solubility in other solvents	No information available	
Partition Coefficient (n-octanol/water)		
Vapor Pressure	No information available	
Density / Specific Gravity	0.9	
Bulk Density	No data available	
Vapor Density	Not applicable	Solid
Particle characteristics	No data available	

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from Residues/Unused Products	Waste is classified as hazardous. Dispose of in accordance with the European Directive on waste and hazardous waste. Dispose of in accordance with local regulations.
Contaminated Packaging	Dispose of this container to hazardous or special waste collection point.



CO_2 Absorbers

- **Hydroxides**: most have a pH between **12-14**
- As the granules become more saturated with CO_2, the pH will increase from basic toward neutral; ***however***, many manufacturers recommend disposal around 50% saturation
- Granules may still exceed pH 12.5 at the time of disposal. Waste determination is required.

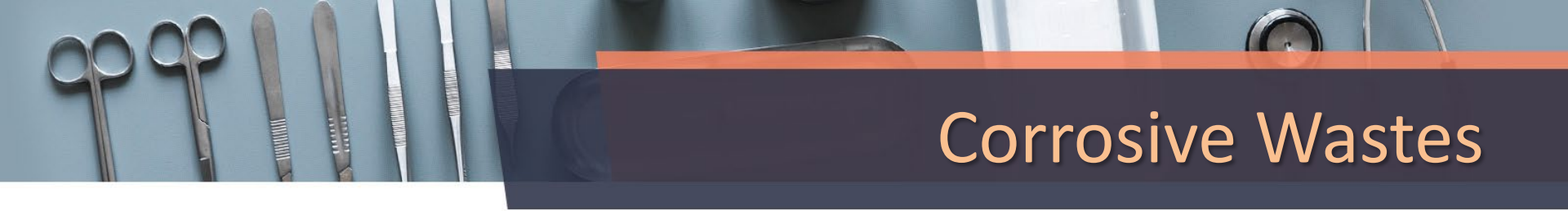
CO_2 Absorbers

The frequency the CO_2 absorber is disposed is typically based on:

 # hours of surgery

-or-

# of days



Corrosive Wastes

- **Aqueous Corrosives = RCRA** *40 CFR 261.22*

  (1) It **is aqueous** and has a pH less than or equal to 2 or greater than or equal to 12.5, as determined by a pH meter ....

  (2) It **is a liquid** and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55 °C (130 °F) ...

- **Non-Aqueous = Non-RCRA (California)** *22 CCR §66261.22* - Definition also includes:

  (3) it is **not aqueous** and, when mixed with an equivalent weight of water, produces a solution having a pH less than or equal to 2 or greater than or equal to 12.5, as determined by a pH meter…;

  (4) it **is not a liquid** and, when mixed with an equivalent weight of water, produces a liquid that corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F)...

WHERE TO LOOK

EQUIPMENT STERILIZATION

EQUIPMENT STERILIZATION

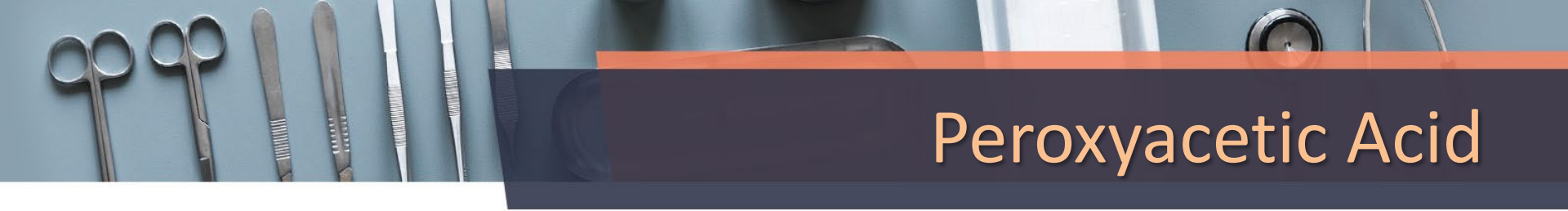
- Sterilization solutions are frequently used in healthcare to disinfect equipment.
- According to the CDC, these include alcohols, chlorine and chlorine compounds, formaldehyde, glutaraldehyde, *ortho*-phthaldehyde, hydrogen peroxide, iodophors, peracetic acid, phenolics, and quaternary ammonium compounds.
- Commercial formulations based on these chemicals are considered unique products and must be registered with EPA or cleared by **FDA**.

EQUIPMENT STERILIZATION

- **According to the FDA:** Medical devices are sterilized in a variety of ways including:
  - Steam
  - Dry heat
  - Radiation
  - Ethylene oxide gas
  - Vaporized hydrogen peroxide
  - Vaporized peracetic acid
  - Chlorine dioxide gas
  - Nitrogen dioxide

EQUIPMENT STERILIZATION

- Chemical disinfectants may be hazardous waste when disposed and require a hazardous waste determination.
- Many of them may be **corrosive**, **reactive** (oxidizers), or **toxic**.



Peroxyacetic Acid

Peroxyacetic acid, ca. 35 wt.% solution in diluted acetic acid, stabilized

---

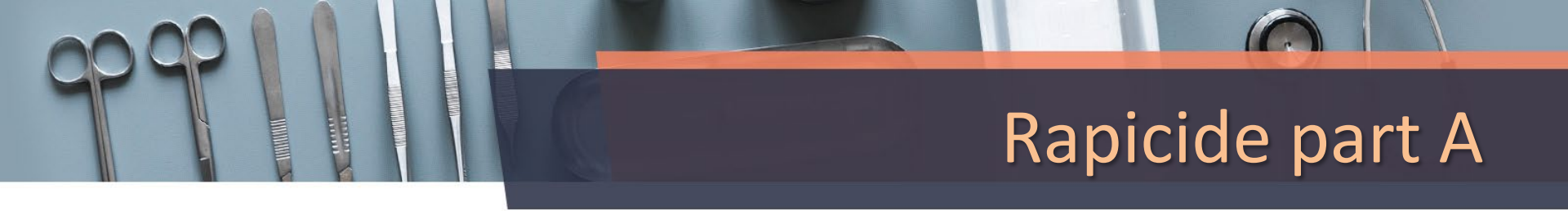
Hazard Statements
Combustible liquid
Heating may cause a fire
Causes severe skin burns and eye damage
May cause respiratory irritation
Harmful if swallowed or if inhaled

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Acetic acid	64-19-7	46-55
Peroxyacetic acid	79-21-0	34-39
Hydrogen peroxide	7722-84-1	11-15

9. Physical and chemical properties

Physical State	Liquid
Appearance	Clear Colorless
Odor	Strong pungent
Odor Threshold	No information available
pH	-1.2
Melting Point/Range	-44 °C / -47.2 °F
Boiling Point/Range	105 °C / 221 °F @ 760 mmHg
Flash Point	62 °C / 143.6 °F



Rapicide part A

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Oxidizing liquid 2
Organic peroxide G
Corrosive to metals 1
Acute toxicity 4 (Inhalation)
Skin corrosion 1A
Serious eye damage 1
Specific target organ toxicity - Single exposure 3

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :

GHS03 GHS05 GHS07

Signal word (GHS-US) : Danger

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable.

3.2. Mixture

Name	Product identifier	%	GHS-US classification
Hydrogen peroxide	(CAS No) 7722-84-1	22	Ox. Liq. 2 Acute Tox. 4 (Oral) Acute Tox. 4 (Inhalation) Skin Corr. 1A
Acetic acid	(CAS No) 64-19-7	9	Flam. Liq. 3 Acute Tox. 4 (Dermal) Skin Corr. 1A
Peroxyacetic acid	(CAS No) 79-21-0	5	Flam. Liq. 3 Org. Perox. D Acute Tox. 2 (Inhalation) Acute Tox. 4 (Oral) Acute Tox. 4 (Dermal) Skin Corr. 1A STOT SE 3
Stabilizer	Proprietary	1	Eye Dam. 1 Met. Corr. 1

SECTION 9: Physical and chemical properties

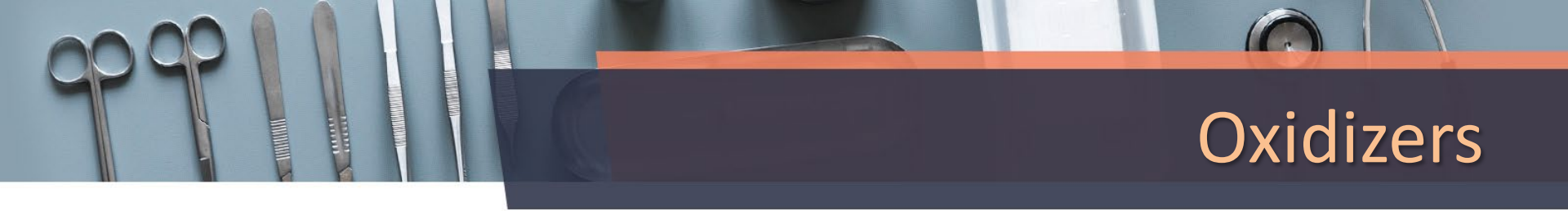
9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Appearance	:	Clear
Color	:	Colorless
Odor	:	Acid, Pungent
Odor threshold	:	No data available
pH	:	0.8 +/- 3

NEUTRALIZATION AND DISPOSAL

Dispose of this product in accordance with all applicable Federal, State and Local regulations. If allowed by federal, state or local regulatory authority, flush spilled solution of RAPICIDE PA (Solutions A & B combined) to the drain using cold water. Run cold water for 15 minutes.

Do not reuse the empty containers. Triple rinse the containers with water and dispose of in an incinerator or in accordance with local, state or federal requirements.

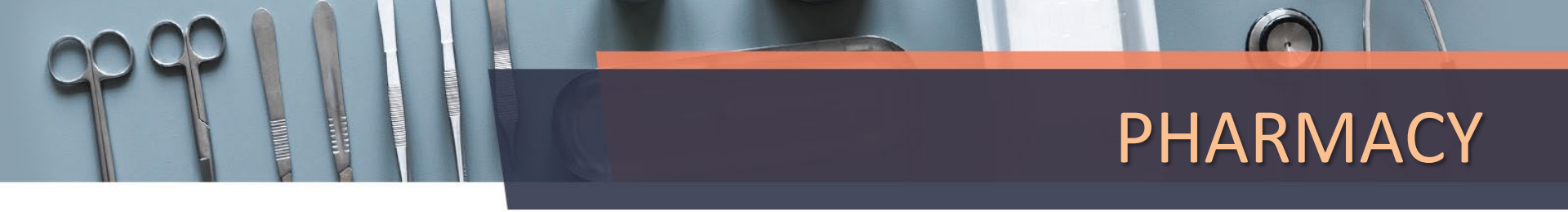


Oxidizers

- Oxidizers are chemicals that react readily with organic materials, which is what makes them good disinfectants. They are effective in destroying microbes.
- But this characteristic also makes chemicals **reactive** and particularly dangerous in a fire. As well as highly **toxic** to aquatic life.

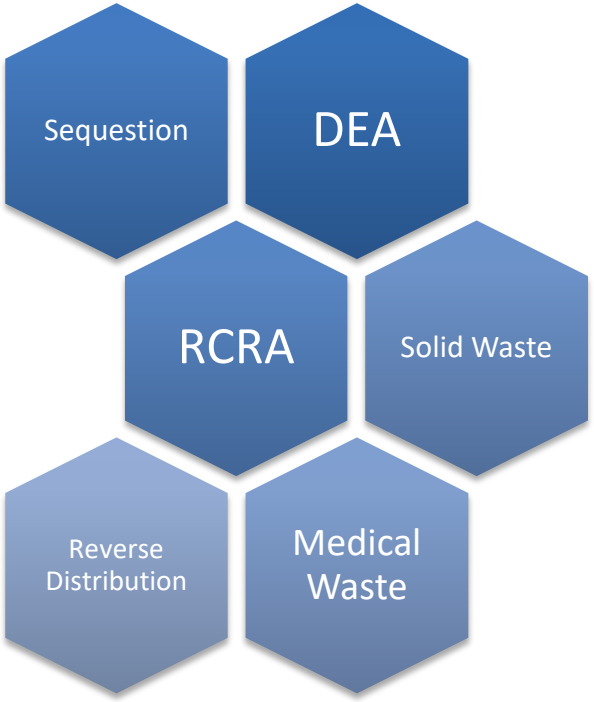
WHERE TO LOOK

PHARMACY



PHARMACY

Pharmacy wastes are **complicated**, and **mischaracterization** of waste is common.



Pharmaceutical Waste Regulation

- **Controlled substances:** Federally regulated by DEA per the Controlled Substance Act of 1970
- **RCRA hazardous waste:** Federally regulated by the Resource Conservation and Recover Act of 1976 .
- **California:** Non-RCRA hazardous waste pharmaceuticals regulated by CDPH & some Med Waste LEAs per the Medical Waste Management Act

2012 EPA Report on Hazardous Waste Pharmaceuticals

U.S. Environmental Protection Agency
Office of Inspector General

12-P-0508
May 25, 2012

At a Glance

Why We Did This Review

We conducted this review to evaluate the U.S. Environmental Protection Agency's (EPA's) process to identify and appropriately classify pharmaceuticals as hazardous waste and to ensure their safe disposal.

Background

The discovery of a variety of pharmaceuticals in water has raised concerns about potentially adverse environmental consequences of these contaminants. Studies have suggested the detection of pharmaceutical compounds in treated wastewater effluent, streams, lakes, seawater, drinking water, and groundwater, as well as in sediments and fish tissue. EPA has the authority under the Resource Conservation and Recovery Act (RCRA) to regulate hazardous waste pharmaceuticals (HWPs) to ensure safe management and disposal practices.

For further information, contact our Office of Congressional and Public Affairs at (202) 566-2391.

The full report is at:
www.epa.gov/oig/reports/2012/20120525-12-P-0508.pdf

EPA Inaction in Identifying Hazardous Waste Pharmaceuticals May Result in Unsafe Disposal

What We Found

Since 1980, EPA has not used its RCRA authority to determine whether pharmaceuticals may qualify as hazardous waste. EPA also has not established a process for the regular identification and review of pharmaceuticals that may qualify for regulation as hazardous waste. Without a regular process, EPA cannot provide assurance that pharmaceuticals that may pose a hazardous risk to human health and the environment have been identified. We identified eight chemicals found in pharmaceuticals that meet EPA's criteria for regulation as acute hazardous waste, but wastes containing these chemicals are not regulated as such. There are over 100 drugs that federal occupational safety organizations have identified as hazardous but may not have been reviewed by EPA to determine whether they may qualify as hazardous waste. EPA staff stated they have started examining these drugs for listing as hazardous waste. Further, the state of Minnesota recently noted that there has been a proliferation of pharmaceutical development since RCRA regulations were established. Our review has identified a risk that there are unknown but potentially dangerous unregulated HWPs that may be unsafely disposed and released into the environment.

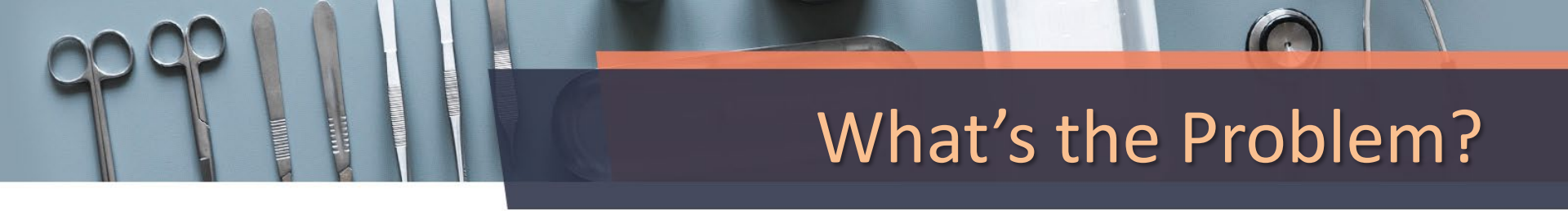
An additional challenge to ensuring the safe disposal of HWPs is that some health care facilities, such as hospitals, may be unaware of federal hazardous waste regulations. The state of Minnesota, for example, has reported that there is a "general lack of awareness by the health care industry of RCRA regulatory requirements." This may result in mismanagement of hazardous waste pharmaceuticals.

In 2008, EPA proposed an amendment to the Universal Waste Rule to address pharmaceutical wastes. However, no action on the Rule has occurred since the close of the public comments period in 2009. During our review, EPA staff informed us that the Agency has decided to develop another proposal for the regulation of hazardous waste pharmaceuticals at health care facilities. EPA staff stated that "due to substantial negative public comments received on the 2008 universal waste proposal, the Agency is developing a revised proposal for regulation of hazardous waste pharmaceuticals at healthcare facilities." EPA anticipates the proposal will be available for public comment in spring 2013.

What We Recommend

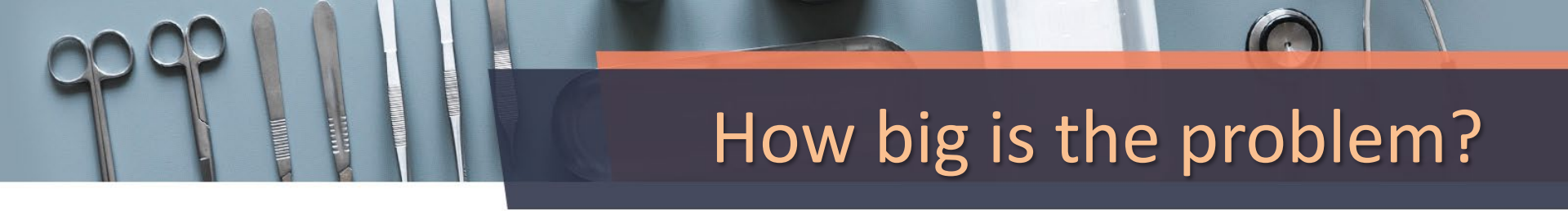
We recommend that EPA establish a process to review pharmaceuticals for regulation as hazardous waste and develop an outreach and compliance assistance plan for health care facilities managing HWPs.

- Review conducted to evaluate the U.S. EPA's process to identify and appropriately classify pharmaceuticals as hazardous waste and to ensure their safe disposal.
- ***"general lack of awareness by the health care industry of RCRA regulatory requirements."***
- http://www.epa.gov/oig/reports/2012/20120525-12-P-0508.pdf



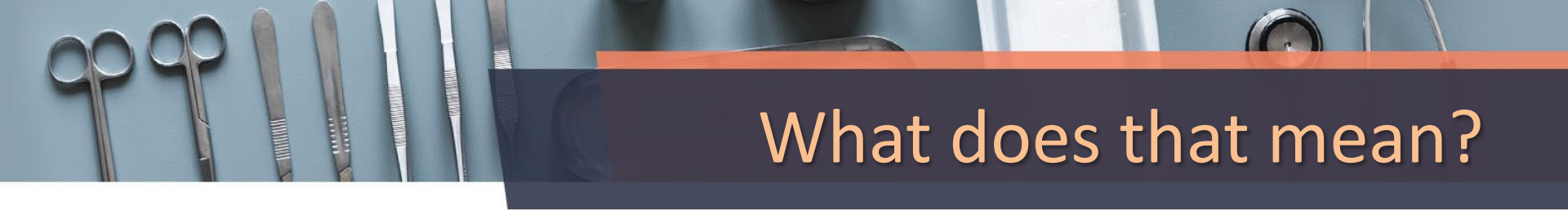
What's the Problem?

- In **1980**, EPA identified approximately 31 chemicals used as pharmaceuticals that met the RCRA hazardous waste criteria, but EPA has **not updated its list since that time**.
- OSHA lists **61** pharmaceuticals on its hazardous drug list which remains a primary reference for identifying drugs that should be handled as hazardous waste.
- The NIOSH Drug Alert list published in 2010 includes **157** drugs that are considered hazardous.
- HOWEVER, the FDA has approves an average of 30 new drugs each year since 1996 (over **800** new drugs).



How big is the problem?

- "The **United States still leads the world** in pharmaceutical production, accounting for 39% of world production"[1]
- "**Americans consume 80%** of opiate painkillers produced in the world."[2]
- **48% percent of Americans** have taken at least one prescription drug in the past month[3]
- In 2007-2008, **1:5 children** and **9:10 older Americans** reported using at least one prescription drug in the past month[4]
- U.S. hospitals and long-term care facilities annually flush approximately **250 million pounds** of unused pharmaceuticals down the drain[5]
- U.S.G.S. conducted a study of 139 streams across the country during 1999-2000 and detected pharmaceutical compounds in **80% of the streams** sampled.[6]



What does that mean?

The majority of prescription medications are left to each individual state to regulate. Some states do not regulate pharmaceutical waste at all

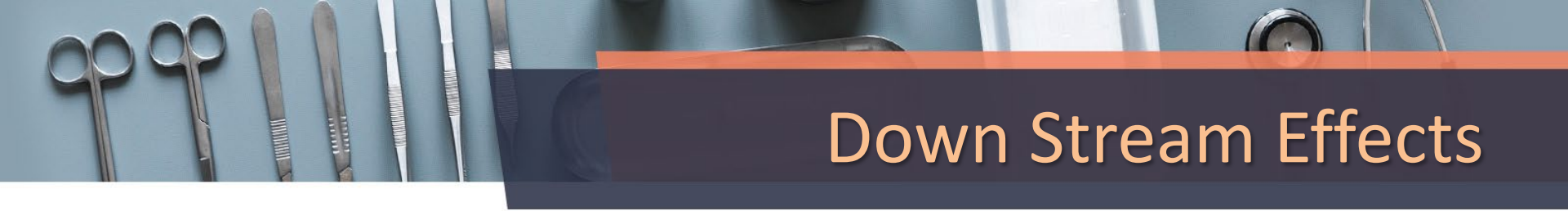
- **Controlled substances:** Federally regulated by DEA per the Controlled Substance Act of 1970
- **RCRA hazardous waste (5%):** Federally regulated by EPA per the Resource Conservation and Recovery Act of 1976
- **All other pharmaceutical waste:** No federal regulations
  - **California:** Regulated by CDPH per the Medical Waste Management Act (24%)
  - **Other States:** USEPA Where You Live - State Medical Waste Programs and Regulations: http://www.epa.gov/osw/nonhaz/industrial/medical/programs.htm

Misunderstanding leads to mismanagement

2008 AP Investigation

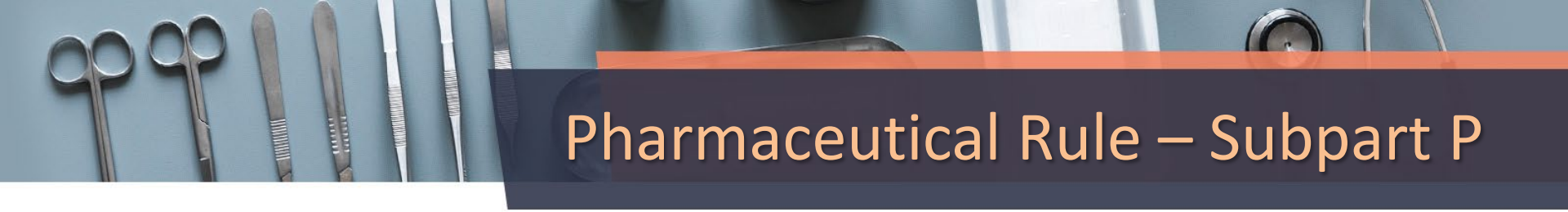
A five-month investigation by the Associated Press discovered that pharmaceuticals, including antibiotics, hormones, pain killers, and anti-seizure compounds, have been found in public drinking water supplied to over 40 million Americans across the US.

- "Drugs found in drinking water" – *USA Today, 3/2008*
- "Drugs in U.S. Drinking Water" – *Medical News Today, 3/2008*
- "Dosed without prescription" – *National Resource Defense Council, 12/2009*



Down Stream Effects

- **Local Impact:** A study of the Tijuana Estuary has shown the presence of antibiotic resistant bacteria caused by “natural” selection from storm water runoff (Cummings, 2008).
- **State Impact:** Drugs have been detected in the drinking water supplies of 24 major metropolitan areas including southern California (AP, 2008)
- **National Impact:** The U.S. Geological Survey (USGS) showed pharmaceutical contamination in national waterways (Barnes et al., 2008).
- **International Impact:** Pharmaceutical contaminates can also make their way into our oceans and food sources as illustrated by antidepressant detection in fish (Raloff, 2008; Bai, 2008).



Pharmaceutical Rule – Subpart P

USEPA's Pharmaceutical Rule amendments went into effect on… The amendments are considered optional because they are less stringent than California's existing hazardous waste program. DTSC is currently considering adopting the amendments "as a whole" which if adopted would require:

- ✓ One-time notification on the EPA Form 8700-12
- ✓ No generator categories under Subpart P *(no "LQG")*
- ✓ No biennial reporting requirement for RCRA HW pharmaceuticals
- ✓ Hazardous waste determination *(and reverse distribution)*
- ✓ May accumulate hazardous and non-hazardous waste pharmaceuticals in the same container
- ✓ Training and record keeping requirements
- ✓ Label accumulation containers with the words "Hazardous Waste Pharmaceuticals". No HW codes nor other labeling requirements
- ✓ Accumulation time limit: 1 year

For more info, go to the 11/6/2022 presentation by DTSC/USEPA

From: Department of Toxic Substances Control <retail@dtsc.ca.gov>
Sent: Tuesday, March 14, 2023 10:55 AM
To: Gurfield, Arleen <Arleen.Gurfield@sdcounty.ca.gov>
Subject: [External] Update: US EPA Management Standards for Hazardous Waste Pharmaceuticals

California Department of Toxic Substances Control

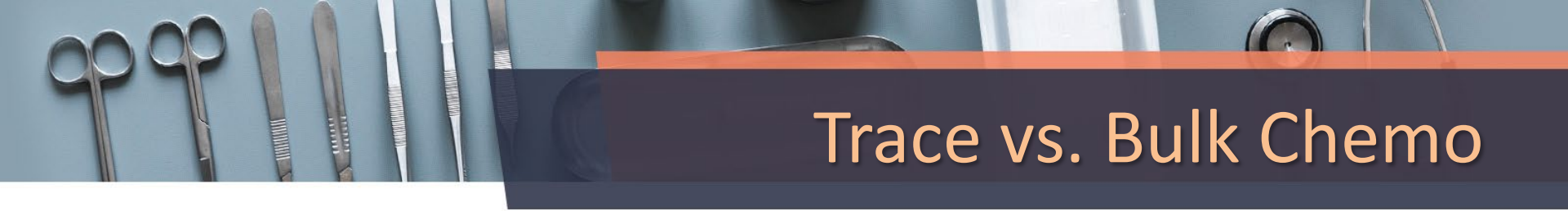
Update: US EPA Management Standards for Hazardous Waste Pharmaceuticals

March 14, 2023

Hello,

You are receiving this e-mail because you attended the Pharmaceuticals Rule workshop on November 9, 2022 or subscribed to the retail@dtsc E-List. DTSC appreciates the feedback you all provided during the virtual workshop and the comment period afterwards. The objectives of the workshop were to provide an overview of the Pharmaceuticals Rule, discuss DTSC's evaluation of the rule, and receive comments on possible adoption in California.

After careful consideration, DTSC will be moving forward with the adoption of the US EPA Management Standards for Hazardous Waste Pharmaceuticals. The rule sets forth new regulations for healthcare facilities and reverse distributors managing pharmaceuticals that are hazardous waste. DTSC will conduct outreach and trainings on the new requirements throughout the year prior to submitting the rulemaking package to the Office of Administrative Law for approval. DTSC expects the regulation to be in effect by the end of the year.



Trace vs. Bulk Chemo

Trace Chemo = MW

HSC 117690(b)(5) “Trace chemotherapeutic waste” means waste that is contaminated through contact with, or having previously contained, chemotherapeutic agents, including, but not limited to, gloves, disposable gowns, towels, and intravenous solution bags and attached tubing that are empty. A biohazardous waste that meets the conditions of this paragraph is not subject to the hazardous waste requirements of Chapter 6.5 (commencing with Section 25100) of Division 20.

Bulk Chemo = HW

22 CCR § 66261.7(p) The residue remaining in a bulk container (as defined in section 66260.10) that has held hazardous waste is not a hazardous waste, except as provided in subsections (p)(2) and (p)(3), and a facility that receives the bulk container for cleaning or reuse, by such receipt is not receiving offsite waste, if the bulk container is empty as defined in subsection (p)(1) below.

(1) A Previous bulk container that has held hazardous waste is empty if:

(A) for a residue that contains a material described in subsection (d) of this section, the bulk container is empty pursuant to subsection (d); or

(B) for a residue that does not contain a material described in subsection (d), the residue is no more than 0.3% by weight of the total capacity of the bulk container.

In other words: >0.3% weight of the container = HW

Summary of Pharmaceutical Waste Streams

Compatible Hazardous Waste*	Aerosols	Trace Chemo (Sharps)	Trace Chemo (Soft)	Non-RCRA Hazardous Drugs	Red Sharps	Municipal Solid Waste	Sewer System
* Dual waste for sharps							
• P-listed (inc. containers) • U-listed • D-listed t toxic, • Ignitable • Bulk chemo • Haz/Chemo spill clean up • PharmE Haz®	• Ignitable aerosols • Pressurized aerosols	• Empty vials and ampules • Empty syringes and needles • Empty IVs	• Gowns • Gloves • Tubing • Wipes • Packaging	• All non-RCRA hazardous pharmaceutical waste • No biohazardous drugs • No sharps	• Empty syringes, needles, ampules (except chemo) • Bio-hazardous drugs	• Most packaging • Most empty bottles and vials • Most empty IVs • Paper • Plastic • No drugs • No P-waste containers	• IVs o Dextrose o Saline o Sterile Water o Lactated Ringer's o K salts o Ca salts o Mg salts • Controlled substances??? • No other drugs
							
Federally Permitted Hazardous Waste Incinerator		Medical Waste Incinerator			Autoclave/ Microwave		Publicly Owned Treatment Works (POTW)
Ash		Ash		Ash	Shredded (Most states)		
Lined Hazardous Waste Landfill		Lined Non-Hazardous Waste Landfill					Water Supply

Sequestration

In conclusion, it is DTSC's position that the placement of RCRA regulated hazardous pharmaceutical waste in a Smart Sink to render it non-retrievable, unrecoverable and unusable is considered treatment of a hazardous waste. However, a healthcare facility that generates RCRA regulated hazardous pharmaceutical waste and places them into a Smart Sink for onsite treatment is exempt from a permit, including a tiered permit, if the healthcare facility meets generator standards in California Code of Regulations, title 22, chapter 12.

Please note that non-RCRA regulated pharmaceutical waste is a subset of medical waste which is defined in the Medical Waste Management Act [Part 14 (commencing with Section 117600) of Division 104 of the Health and Safety Code]. Medical wastes are not subject to California hazardous waste control laws (Health and Safety Code, section 25117.5). Therefore, non-RCRA pharmaceutical waste would also not be subject to hazardous waste permitting or other forms of authorization when placed into a Smart Sink.

Thank you again for questions concerning this matter. If you have any additional questions regarding this, please contact me at (916) 255-6549.

Sincerely,

Kevin Sanchez
Sr Environmental Scientist (Sup)
Hazardous Waste Management Program
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, California 95826

WHERE TO LOOK

MORGUES AND MORTUARIES

MORGUE/MORTUARY

In a hospital, the morgue is where bodies are held until they are retrieved. Many often have an autopsy table for examining cadavers or collecting tissues.

Tissues are then placed in formalin (**10% formaldehyde**) or related solution for “fixing” the tissues before going to histology.

MORGUE/MORTUARY

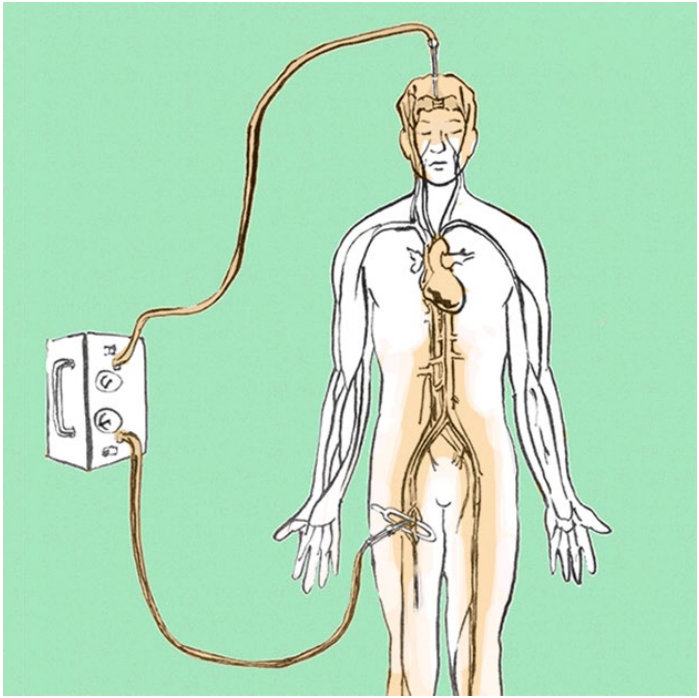
The practice of embalming has been around since 3200 BC as started by the Egyptians.

According to the CA Funeral Bureau there are **1,107** funeral homes/mortuaries in California as of March 2023.

[Public Information - Licensee Lists Overview - California Department of Consumer Affairs]

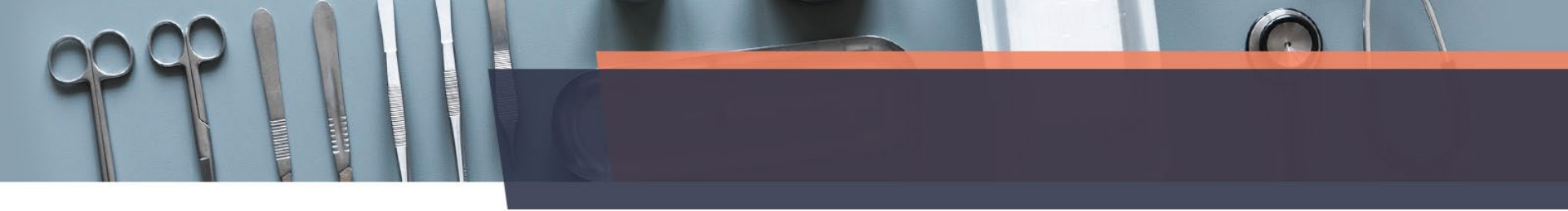
MORGUE/MORTUARY

Today, embalming is typically done in funeral homes. The body is first cleaned and any fluids are removed. Then, embalming fluid is injected into the arteries, which helps to preserve the body tissues. Excess embalming fluid is often flushed down the drain.

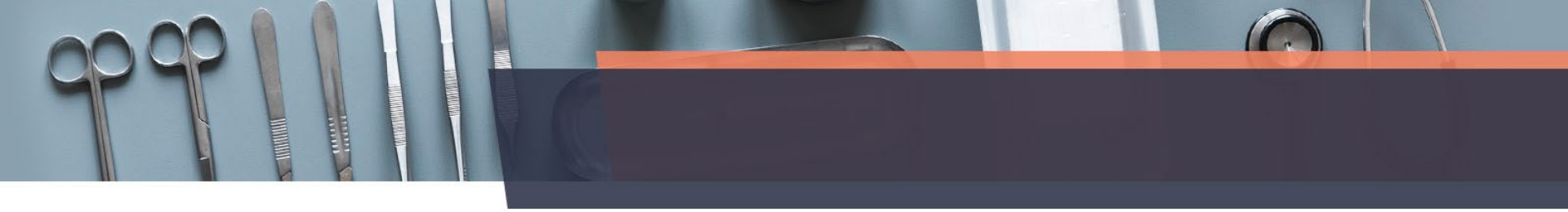


MORGUE/MORTUARY

- Embalming Machines and Solutions



Typically embalming fluid contains a mixture of **formaldehyde, methanol, ethanol** and other solvents. The **formaldehyde** content generally ranges from 5 to 35 percent and the **ethanol** content may range from 9 to 56 percent.



Embalming Fluid

3. Composition/information on ingredients

This product contains the following substances that present a hazard within the meaning of the relevant State and Federal Hazardous Substances regulations.

Ingredient/Chemical Designations	Weight %	GHS Classification	Notes
Formaldehyde CAS Number: 0000050-00-0	25 - 50	Acute Tox. 3;H331 Acute Tox. 3;H311 Acute Tox. 3;H301 Carc. 1B;H350 Muta. 2;H341 Skin Corr. 1B;H314 Skin Sens. 1;H317	[1][2]
Methanol CAS Number: 0000067-56-1	1.0 - 10	Flam. Liq. 2;H225 Acute Tox. 3;H331 Acute Tox. 3;H311 Acute Tox. 3;H301 STOT SE 1;H370	[1][2]
Propylene glycol	1.0 - 10		[1]

Item	Category	Hazard
Acute Toxicity (mouth)	4	Harmful if swallowed.
Acute Toxicity (skin)	3	Toxic in contact with skin.
Acute Toxicity (inhalation)	2	Fatal if inhaled.
Skin corrosion/irritation	1B	Causes severe skin burns and eye damage.
Eye damage/irritation	1	Causes serious eye damage.

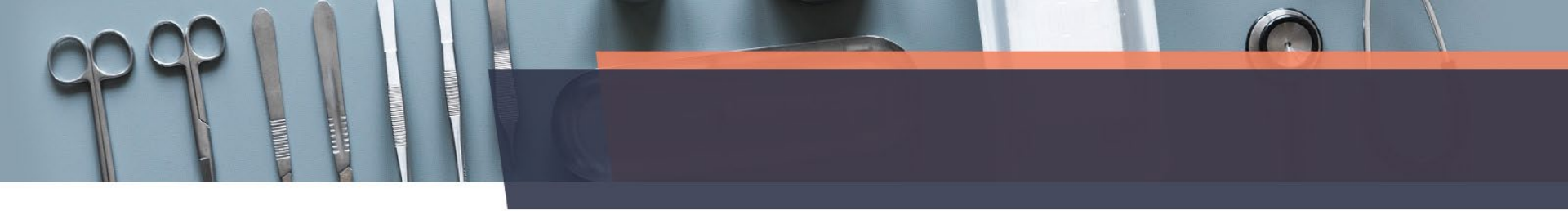
Flash Point	57-60C 134-140F
Evaporation rate (Ether = 1)	< 1 (n-Butyl acetate = 1)
Flammability (solid, gas)	Not Applicable
Upper/lower flammability or explosive limits	**Lower Explosive Limit:** 7% **Upper Explosive Limit:** 73%
Vapor pressure (Pa)	Not Measured
Vapor Density	Greater than 1
Specific Gravity	1.070-1.080
Solubility in Water	Complete
Partition coefficient n-octanol/water (Log Kow)	Not Measured
Auto-ignition temperature (°C)	Not Measured
Decomposition temperature	Not Measured
Viscosity (cSt)	Not Measured
VOC %	97%

12.1. Toxicity

Very toxic to aquatic life with long lasting effects.

Aquatic Ecotoxicity

Ingredient	96 hr LC50 fish, mg/l	48 hr EC50 crustacea, mg/l	ErC50 algae, mg/l
Formaldehyde - (50-00-0)	1.41, Oncorhynchus mykiss	5.80, Daphnia pulex	0.788 (96 hr), Ulva pertusa
Methanol - (67-56-1)	100.00, Pimephales promelas	10,000.00, Daphnia magna	16.912 (96 hr), Ulva pertusa
Propylene glycol - (4254-16-4)	Not Available	Not Available	Not Available



United States Environmental Protection Agency

Office of Solid Waste and Emergency Response

EPA

DIRECTIVE NUMBER: 9444.07(85)

TITLE: Exclusion from RCRA Requirements of Used Embalming Fluids

APPROVAL DATE: 5-17-85

EFFECTIVE DATE: 5-17-85

ORIGINATING OFFICE: Office of Solid Waste

☒ **FINAL**

☐ **DRAFT**

STATUS:
[ ] A- Pending OMB approval
[ ] B- Pending AA-OSWER approval
[ ] C- For review &/or comment
[ ] D- In development or circulating headquarters

REFERENCE (other documents):

261 , SUBPART D - LISTS DOC: 9444.07(85)

Key Words: Formaldehyde

Regulations: 40 CFR 261.33

Subject: Exclusion from RCRA Requirements of Used Embalming Fluids

Addressee: Paul Baltay, Director, State Program Division, Office of Drinking Water

Originator: Eileen B. Claussen, Director, Characterization and Assessment Division, Office of Solid Waste

Source Doc: #9444.07(85)

Date: 5-17-85

Summary:

Used embalming fluid, even though it contains formaldehyde, does not qualify as a listed hazardous waste. Section 261.33 lists commercial chemical products which are hazardous when discarded or intended to be discarded. It does not apply to wastes that result from the intended use of the product.

9444.07 (85)

MAY 17 1985

RCRA Input to Region IV Inquiry: UIC Well Inventory Update

Eileen B. Claussen, Director
Characterization and Assessment Division
Office of Solid Waste (WH-562)

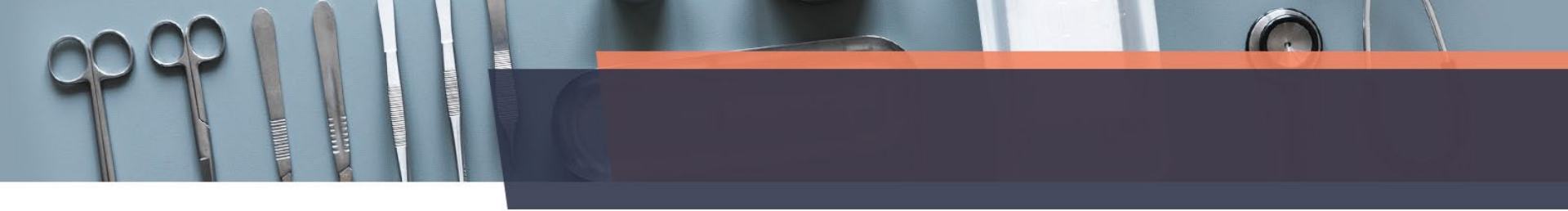
Paul Baltay, Director
State Programs Division
Office of Drinking Water (WH-550)

Per your request the following paragraph is the RCRA response to the embalming fluid question in the subject inquiry.

The RCRA hazardous waste identification regulations contain two mechanisms for identifying a waste as a hazardous waste, lists and characteristics. A waste is a hazardous waste if it either is listed (40 CFR 261.31, 32, or 33) or it exhibits one or more of the defined characteristics (§261.21, 22, 23, or 24). While used embalming fluids do not qualify as hazardous under any of these criteria, many people mistakenly believe thay they do because formaldehyde, the key ingredient in such products, is listed under §261.33. Section 261.33 lists commercial chemical products which are hazardous wastes when discarded or intended to be discarded. It does not include wastes which result from the intended use of the product. Thus, embalming fluid, since it consists of formaldehyde plus some inert ingredients (e.g., colorants and perfumes), would be a hazardous waste if discarded unused and the septic tank/tile field could classify as a Class 4 well. However, if the generator is disposing of embalming fluid which has been used, for example, to flush body fluids out of the cadaver, then disposal of the fluid does not constitute disposal of a hazardous waste and the tank/field is not a Class 4 well.

WH-562B/DFRIEDMAN/ACORSON/margaret/rm S248/382-4770/5-17-85
DFA Diskette

- Unused = RCRA hazardous waste
- Used = not RCRA hazardous waste
- *But what about California?*



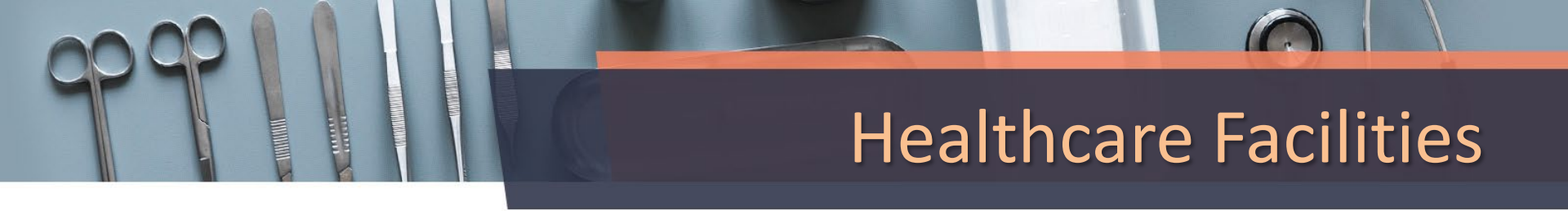
Memo Detail

Full Document:
RCRA Online Number: 12406
Title: EMBALMING FLUIDS, USED
Document Date: 1985-05-17
To: Baltay, HQ
From: Claussen
Organization of Recipient: EPA
Description: Unused embalming fluid containing formaldehyde as the sole active ingredient is a listed waste if disposed. Section 261.33 does not apply to wastes which result from the intended use of a product. Used embalming fluid is neither listed nor characteristic and so it is not a hazardous waste.
Regulatory Citation(s): 261.33, 261.20 EXIT Disclaimer
RPPC Number: 9444.1985(07)
Official ORCR Policy: Yes
Associated Topic(s): Chemicals (RCRA), Disposal, Hazardous Waste

…and what if formaldehyde is not the **sole** active ingredient?

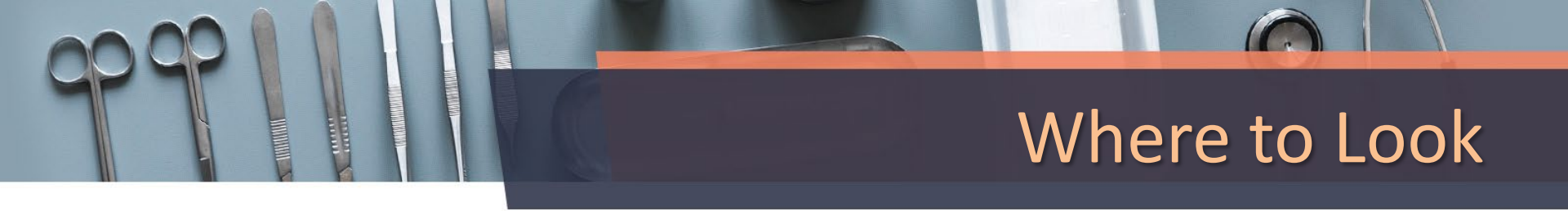
TBD

RECAP



Healthcare Facilities

- Hospitals
- Medical Schools and Universities
- Outpatient Surgery Centers
- Diagnostic Testing Laboratories (human, animal, plant)
- Research Facilities
- Specialty Medical Clinics (e.g. Oncology Centers, Dialysis Clinics)
- Veterinary Hospitals and Clinics
- Mortuary and Autopsy Facilities
- Blood banks and collection services
- Nursing homes and Assisted-Living centers
- Ambulance Services



Where to Look

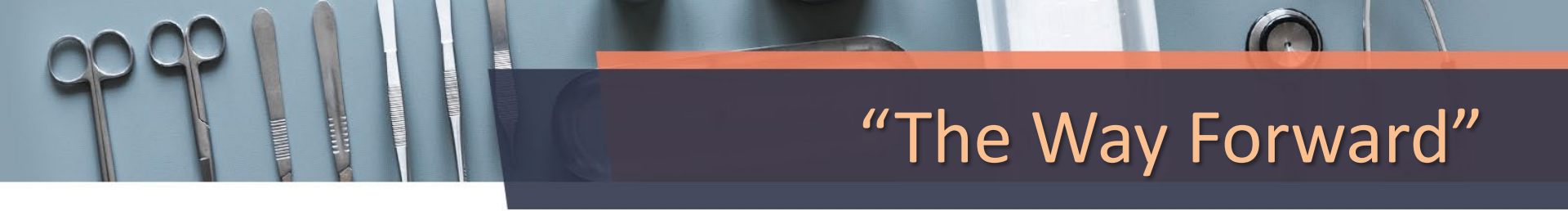
- Laboratories
- Surgical Suites
- Pharmacy
- Morgue and Mortuaries
- Oncology
- ?

Other CUPA Programs

- **HMBP:**
  - Ethylene Oxide: 200 cuft. or more
  - Oxygen, Nitrogen, Nitrous Oxide (Medical gases): 1,000 cu.ft or more
  - Helium (MRI machines): 1,000 cuft or more
  - Hazardous materials ≥ 55 gallons, 500 pounds, or 200 cubic feet
- **APSA:**
  - Emergency generator tanks >1,320 gallons
- **USTs:**
  - Underground emergency generator tanks

Other Regulatory Agencies

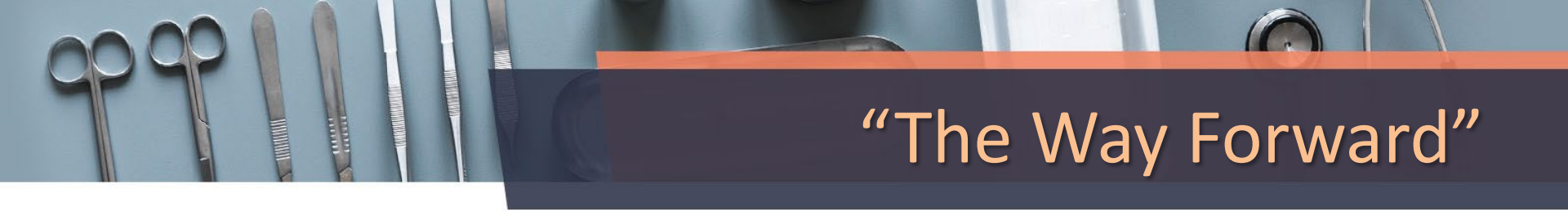
- Industrial Wastewater Agency *(Hazardous waste to sewer)*
- Local Enforcement Agency *(Medical Waste generators and onsite treatment facilities)*
- California Department of Public Health *(Medical Waste transporters and offsite treatment facilities)*
- Department of Toxic Substances Control *(Hazardous Waste Transporters and TSDFs)*
- Air Pollution Control District *(Crematoriums and TSDFs)*



“The Way Forward”

“The management of healthcare waste requires increased attention and diligence to avoid adverse health outcomes associated with poor practice, including exposure to infectious agents and toxic substances.”

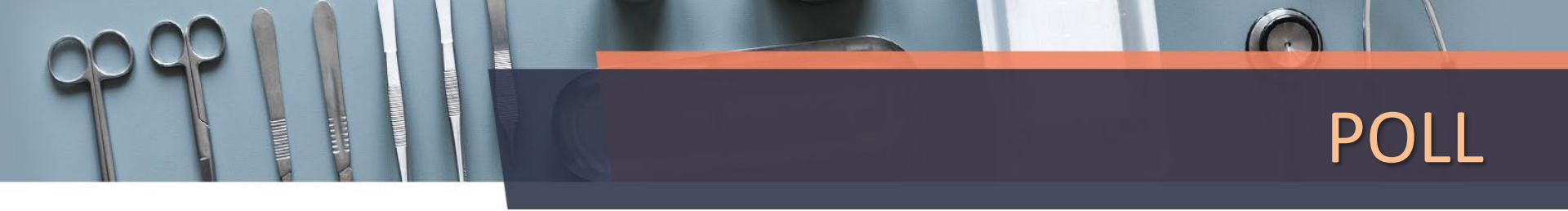
- World Health Organization, 2018



“The Way Forward”

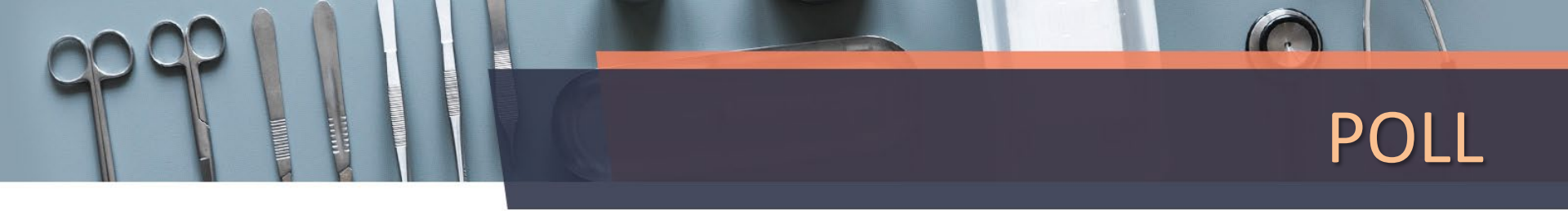
Key elements in improving healthcare waste management:

- Raise awareness of the risks related to healthcare waste, and of safe practices
- Build a comprehensive system, addressing responsibilities, resource allocation, handling and disposal. This is a long-term process, sustained by gradual improvement
- Select management options to protect people from hazards when collecting, handling, storing, transporting, treating or disposing of waste
- Evaluate processes to minimize hazardous wastes
- Ensure proper waste segregation
- Where feasible, use treatment of hazardous healthcare wastes rather than disposal
- Develop strategies and systems for program improvement.
- Implement strong program oversight and regulation



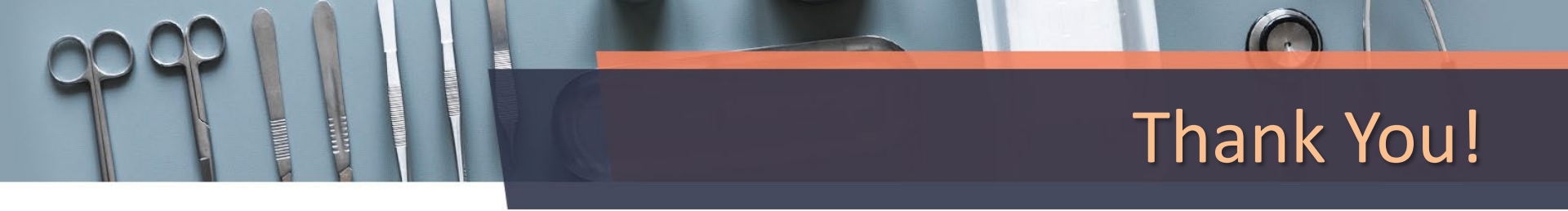
POLL

Question #4: In one word, how would you describe today's training?



POLL

Question #5: Send me your questions or feedback!



Thank You!

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County of San Diego – Hazardous Materials Division
Email: arleen.gurfield@sdcounty.ca.gov
Work cell: (858) 229-1135