CHEMTRADE

PAPTAC
Pulp and Paper Technical Association of Canada
Association technique des pâtes et papiers du Canada

Safety session:
Sulfuric Acid

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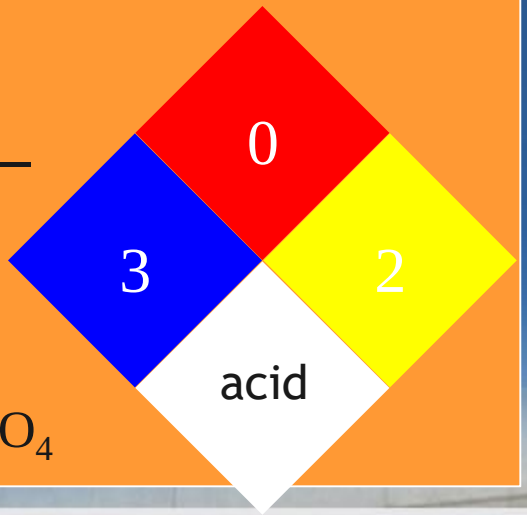
Why do you take a sulfuric acid seminar?

- Strong inorganic acid (pH = 0.3) Water (pH = 7)
- Very corrosive product (skin and eyes)
- It is not explosive and radioactive
- React with metals to produce H____



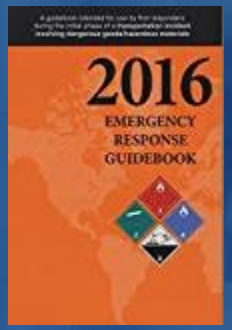
NFPA SYMBOl for H_2SO_4


Welcome!!!
-Sulfuric Acid transportation
-Chemical and physical properties
-PPE
-Safety Showers
-Spills
-Confined space
-Quiz
QUIZ

Sulfuric acid transportation

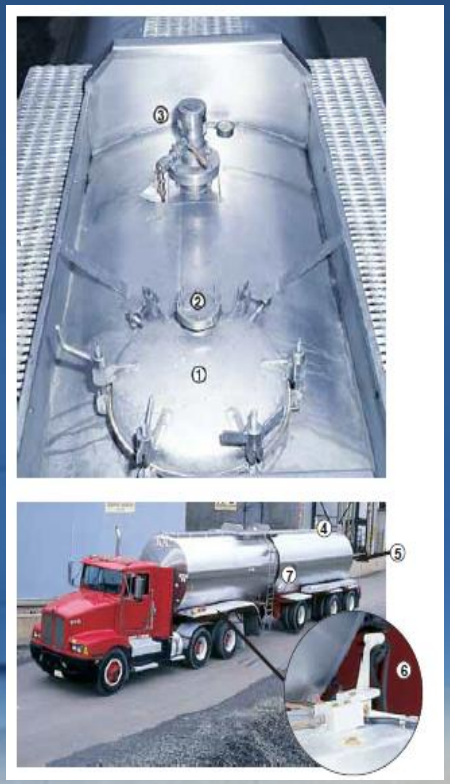
Sulfuric acid transportation

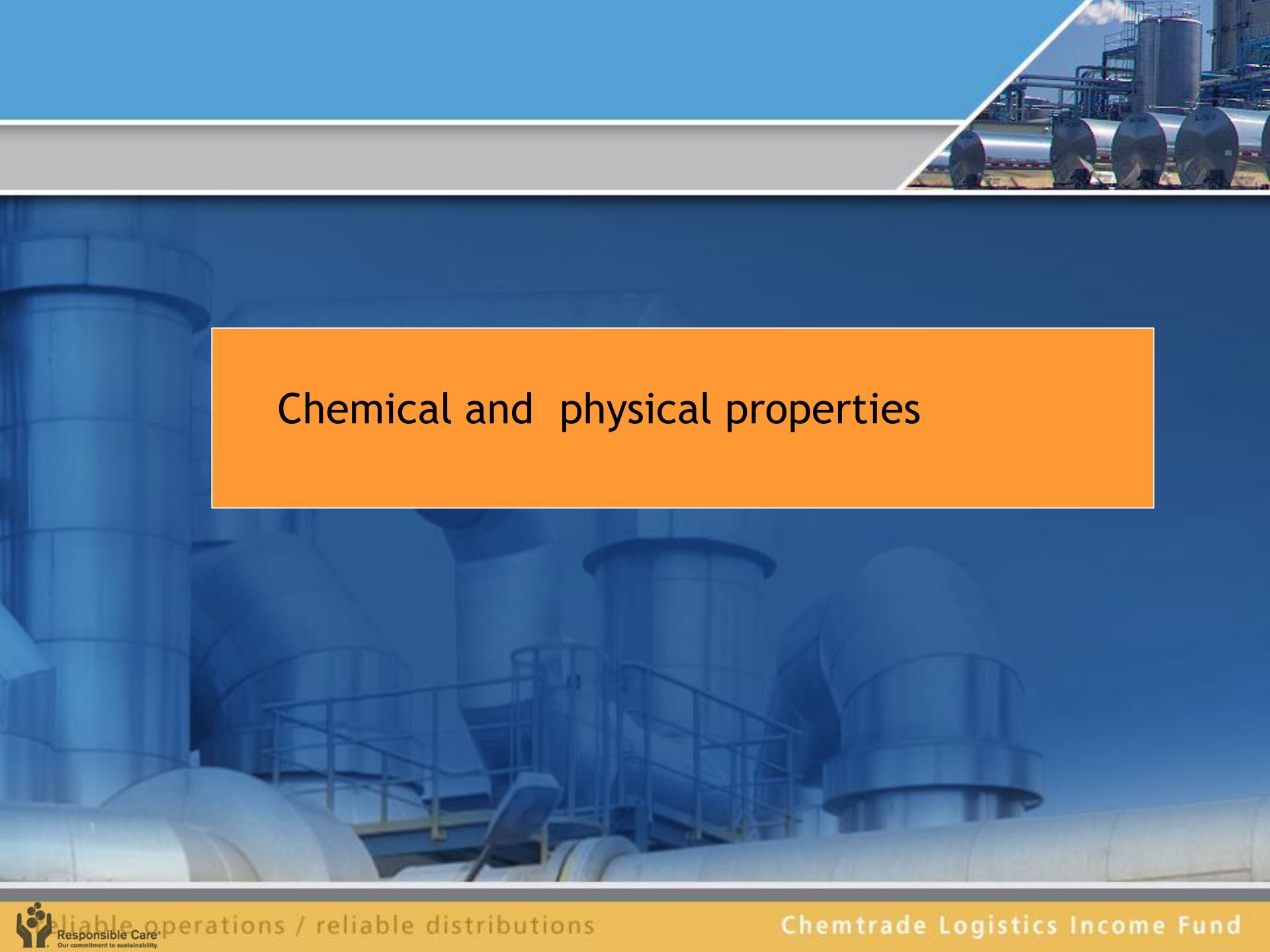
Railcars



UN 1830, SULFURIC ACID
Class 8, PG II,
ERG 137

Trucks

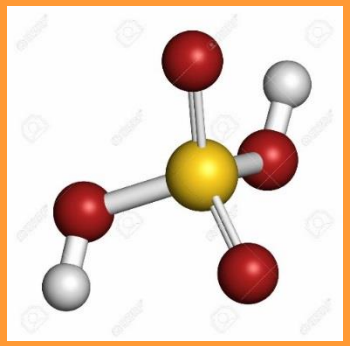


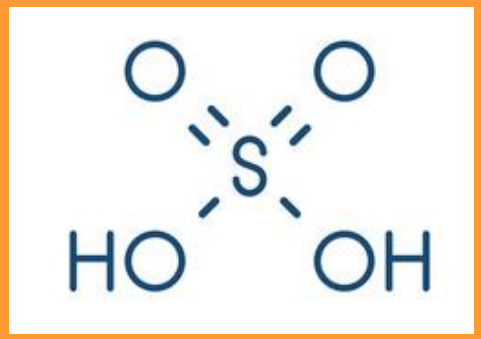


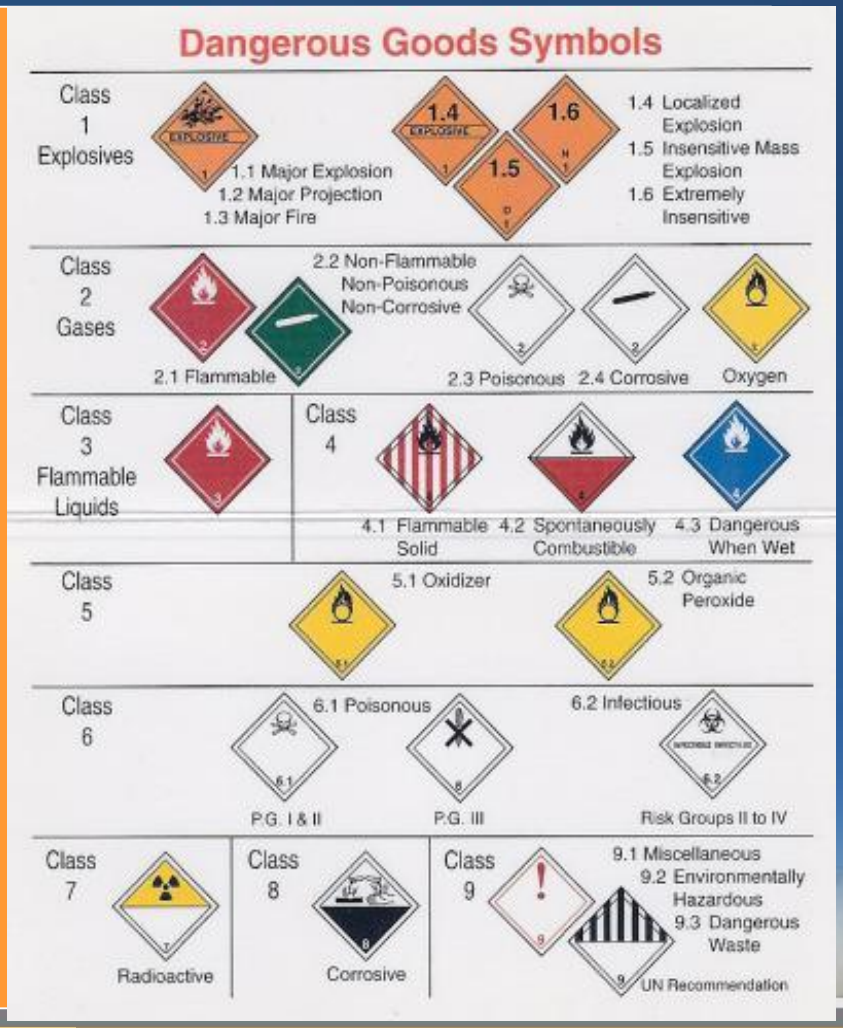
Chemical and physical properties

Chemical and physical properties

- Chemical formula: H_2SO_4
- Color: Clear to slightly Turbid oily liquid
- Odor: None
- Specific gravity: 1.8







Chemical and physical properties

QUESTIONS:

1) On the placard, what is the meaning of this drawing at the top ?

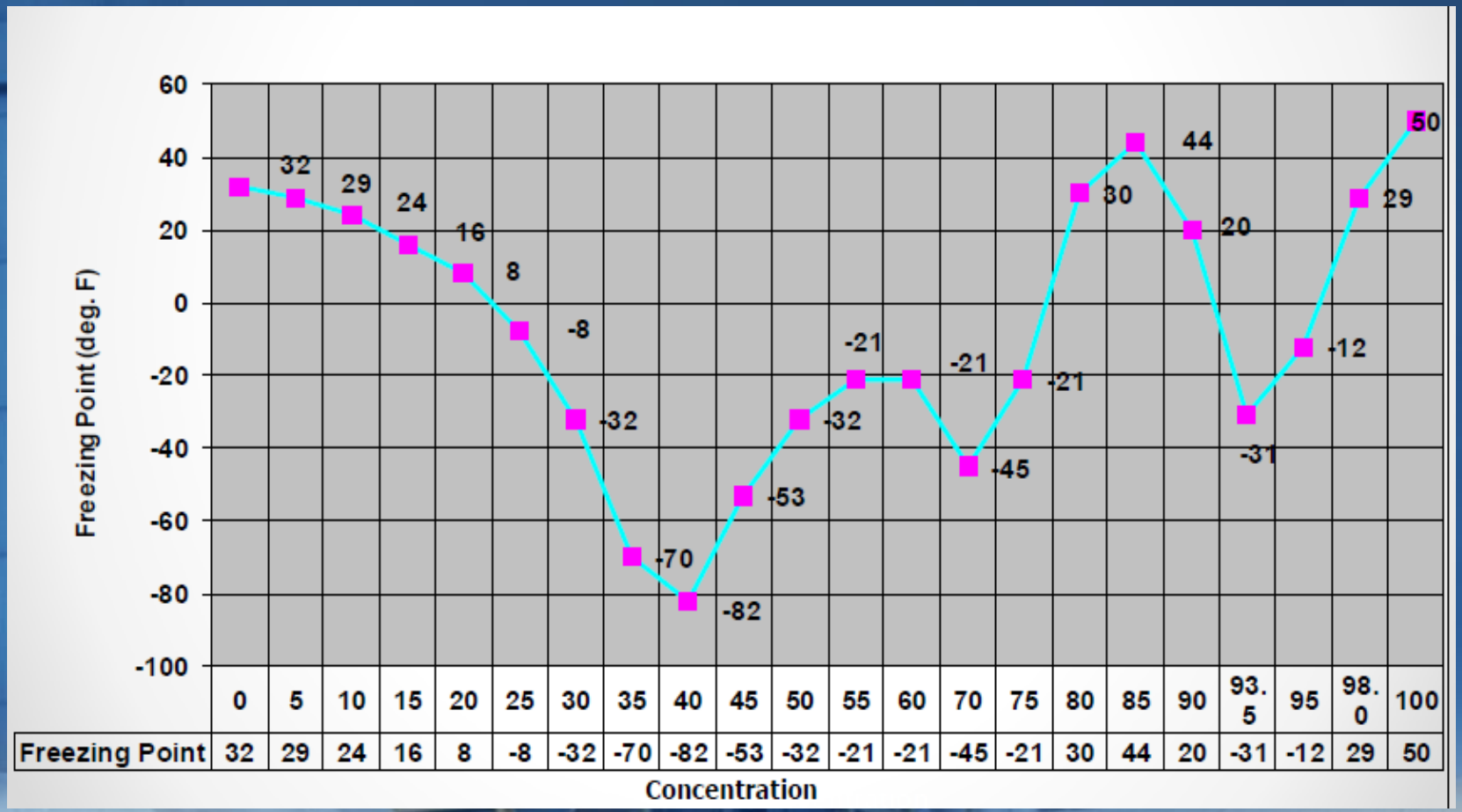
2) What is the best way to mix water and acid

A) Acid in Water
B) Water in Acid?

ANSWER is A

Why 93% ???
Why not 96 or 98% ?

Freezing Sulfuric acid Graph



Concentration	0	5	10	15	20	25	30	35	40	45	50	55	60	70	75	80	85	90	93.5	95	98.0	100
Freezing Point	32	29	24	16	8	-8	-32	-70	-82	-53	-32	-21	-21	-45	-21	30	44	20	-31	-12	29	50

Difference between 93% and 98%

Properties	93%	98%
% H_2SO_4	93.2 min.	98 min.
Freezing poing	**-35 C / -31 F**	**-2 C / 29 F**
Boiling point	279 C	327 C
Specific gravity (15.6c)	1.835	1.844
Viscosity, cP, (20 C)	22	25
color	Clear to slightly turbid oily liquid	Clear to slightly turbid oily liquid
Odor	None	None

Personal Protective Equipment

Protective Personnal Equipment

Acid Handling:

-Hard Hat, face shield

- ''Goggle'' –**Safety glasses not adequate (Why?)**

-Acid resistant glove

-Acid resistant splash suit

-Acid resistant boots with steel toe

-For a « line break »: acid resistant hood is required

-Respiration protection- not generally required

Did I forget something?

Is it too much?

Acid Burns

Acid Burns

First Aid for Sulfuric Acid burns

First aid for Sulfuric acid Burns

Skin Contact

IMMEDIATELY:

-Wash under a safety shower for a minimum of 20 minutes while removing contaminated clothing;

-Call for Medical help;

-Apply ice water compress to affected body area. **(Greatly decrease chance of scarring and keep burn cool);**

-Do not apply creams or oinments in lieu of ice water compress, unless directed by a physician.

Safety shower requirements

ANSI Z358

-Safety showers are necessary Equipment for the safe handling of sulfuric acid;

-Must be located within 10 seconds;

-Walk on the Same Level as the Hazard;

-Water should be « tepid » 78F - 92F **(26 C to 33 C)**;

-Must not be obstructed by doors, equipment;

-Must provide 20 minutes of 20 USGPM for the shower and 0.4 usgpm for the eye wash operated simultanously (ANSI Z358)

Conventional Equipement & Freeze protected emergency shower (ANSI Z358)

Winter shower

First aid for Sulfuric acid Burns

EYE CONTACT

IMMEDIATELY:

-While holding eyelids open, was over an eyewash station for a minimum of 20 minutes

-Call for medical help;

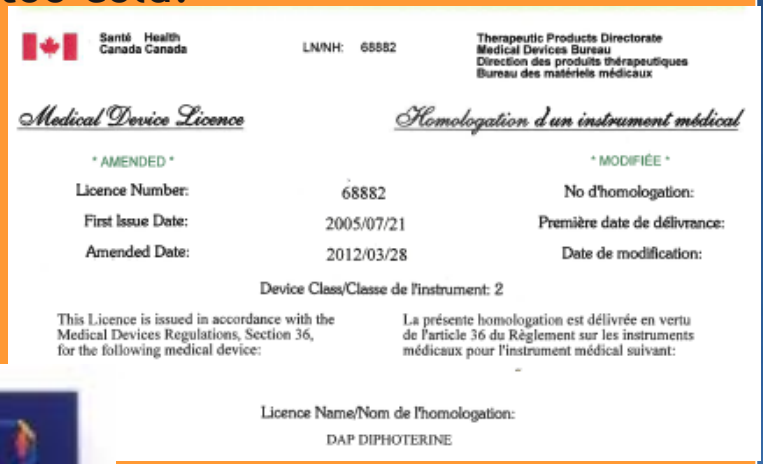
First aid for Sulfuric acid Burns

THEORY BEHIND WATER WASHING:

- -Surface washing to quickly remove the aggressive product
- -Dilution of the chemical to reduce its aggressiveness
- -Universal product to avoid the risk of errors at the time of the accident
- -Eye opening for 20 Min??
- -Risk of hypothermia if the water temperature is too cold.

MANY MILLS IN CANADA : Diphoterine

- -AMPHOTERIM CHELATE
- -Stop the chemical penetration into skin and eye



Santé Canada Health Canada

LN/NH: 68882

Therapeutic Products Directorate
Medical Devices Bureau
Direction des produits thérapeutiques
Bureau des matériels médicaux

Medical Device Licence — *Homologation d'un instrument médical*

* AMENDED * — * MODIFIÉE *

Licence Number:	68882	No d'homologation:
First Issue Date:	2005/07/21	Première date de délivrance:
Amended Date:	2012/03/28	Date de modification:

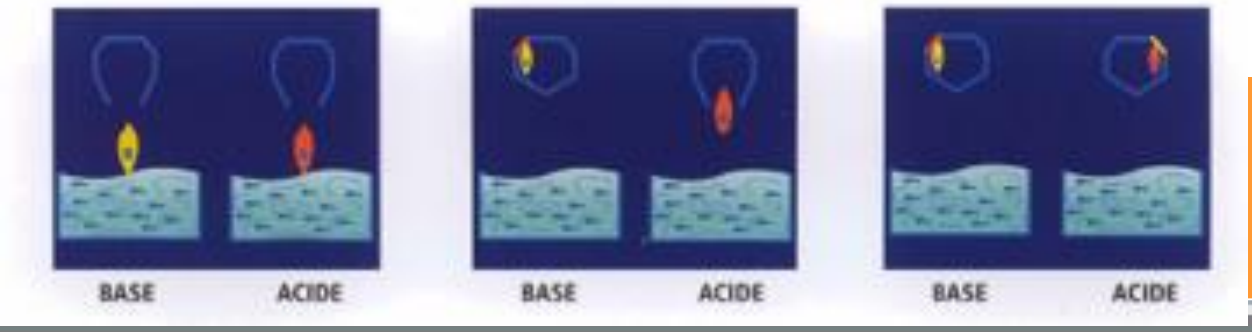
Device Class/Classe de l'instrument: 2

This Licence is issued in accordance with the Medical Devices Regulations, Section 36, for the following medical device:

La présente homologation est délivrée en vertu de l'article 36 du Règlement sur les instruments médicaux pour l'instrument médical suivant:

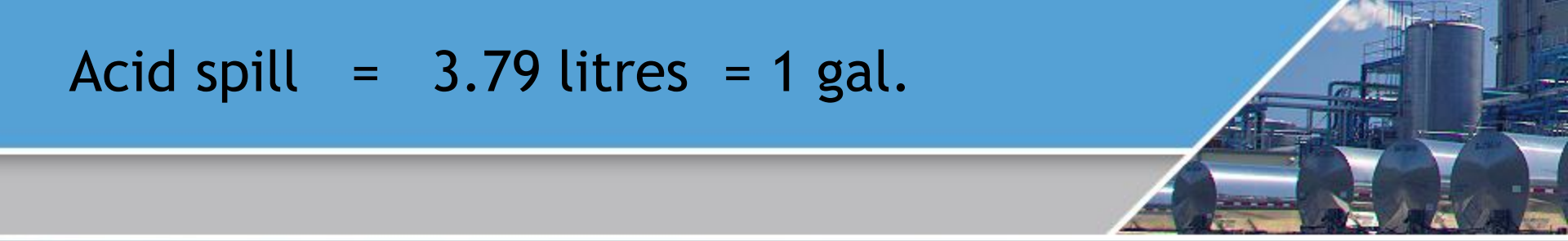
Licence Name/Nom de l'homologation:

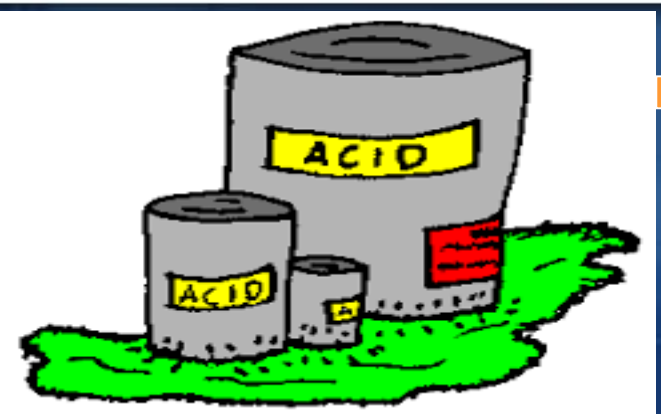
DAP DIPHOTERINE



Spills !!!

Acid spill = 3.79 litres = 1 gal.





Spill 1 gal. = 3.79 l

pH = 0.3

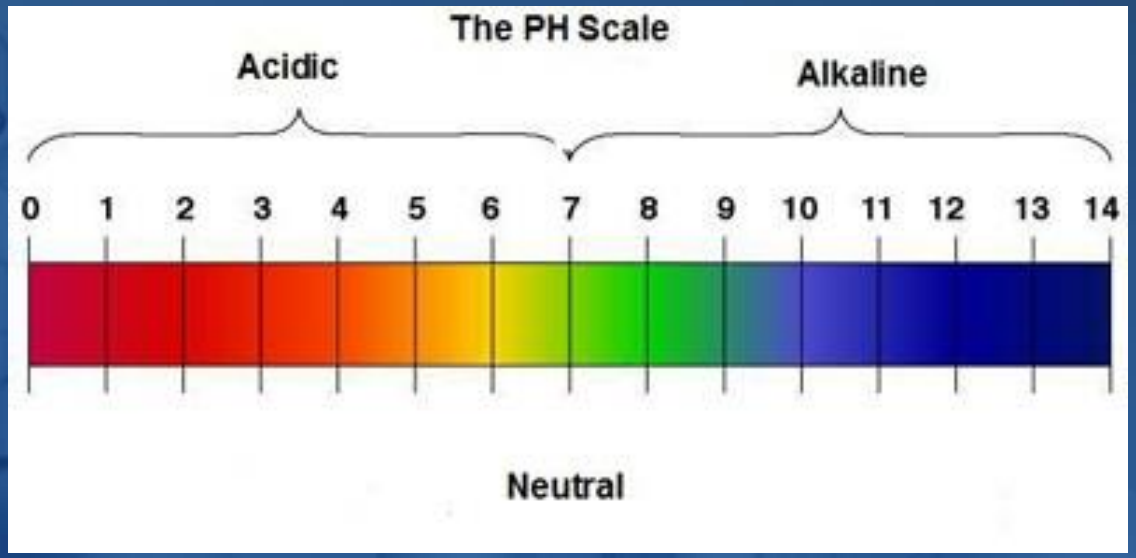
pH GOAL = 7

Can we use water dilution for a solution?

Fresh water	pH
10 gal.	1
100 gal.	2
1 000 gal.	3
10 000 gal.	4
100 000 gal.	5
1 000 000 gal	6

What is the best solution?

Acid spill = 3.79 litres = 1 gal.



1) H_2SO_4 has a pH of 0.3
2) Can we take a Alkaline product to increase the pH?
3) How do we calculate the weigh of Alkalin product?

Acid spill = 3.79 litres =1 gal.

Step 1: Determine the acid weight

a) Acid Specific gravity is = 1.8

b) Weight of water is 10 lbs/ imp pour 1 gallon

c) Weight of acid = 1.8 * 10 * (# gal. d'acide) = Weight of acid = WA

Step 2: Determine the Alcaline weight

a) Alcaline = WA * Value in the table

	Quick Lime	Hydrated Lime	Lime Stone	Soda Ash
	CaO	$Ca(OH)_2$	$CaCO_3$	Na_2CO_3
LBS needs to neutralize 1 lbs H_2SO_4	0.54	0.72	0.97	1.01

EXEMPLE

Spill of 2 gallons of acid:

Step 1: Determine the Acid Weight

Weight of acid = 1.8 * 10 * (2 gal) = WA = 36 lbs

Step 2: Determine the Alcaline weight

	Quick lime	Hydrated lime	Lime Stone	Soda Ash
	CaO	$Ca(OH)_2$	$CaCO_3$	Na_2CO_3
Pounds (LBS) of Alkaline	19.44	25.92	34.92	36.36

Step 3: Add at least 10% for the security coefficient

CaO = 25 lbs $Ca(OH)_2$ = 30 lbs $CaCO_3$= 40 lbs Soda ASH= 42 lbs

Few comments !!!

-The neutralisation is exothermic…

The reaction will create heat

-Acid vapor may be generated during the neutralisation.

-During the neutralisation, verify the pH in many areas to caracterize the solution.

Confined space

Confined Space

-Confined space with sulfuric acid (Carbon Steel tank)

H_2SO_4 + Tank made with Fe → $FeSO_4$ + H_2

- What is the risk?

- Hydrogen may be PRODUCED

Are you ready?

Sulfuric acid QUIZ

1) What kind of Hazard do you need to know before handling sulfuric acid?

2) What kind of PPE do you need?

3) What is the pH for the Sulfuric acid?

4) What is the difference between 93% and 98% ?

5) From ANSI Z358, what kind of requirement do we need for safety shower?

Sulfuric acid QUIZ

6) For the same volume, is it the water or the acid is heavier?

7) What is the UN number for the Sulfuric acid?

8) Which product do you have to neutralize acid spill?

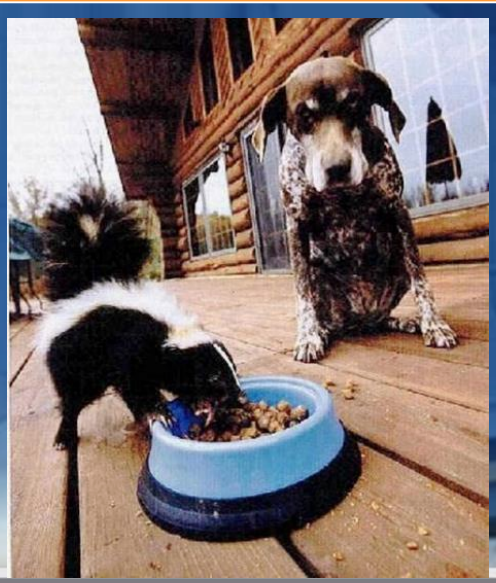
9) How much time do I need to stay under safety shower in case of acid burn?

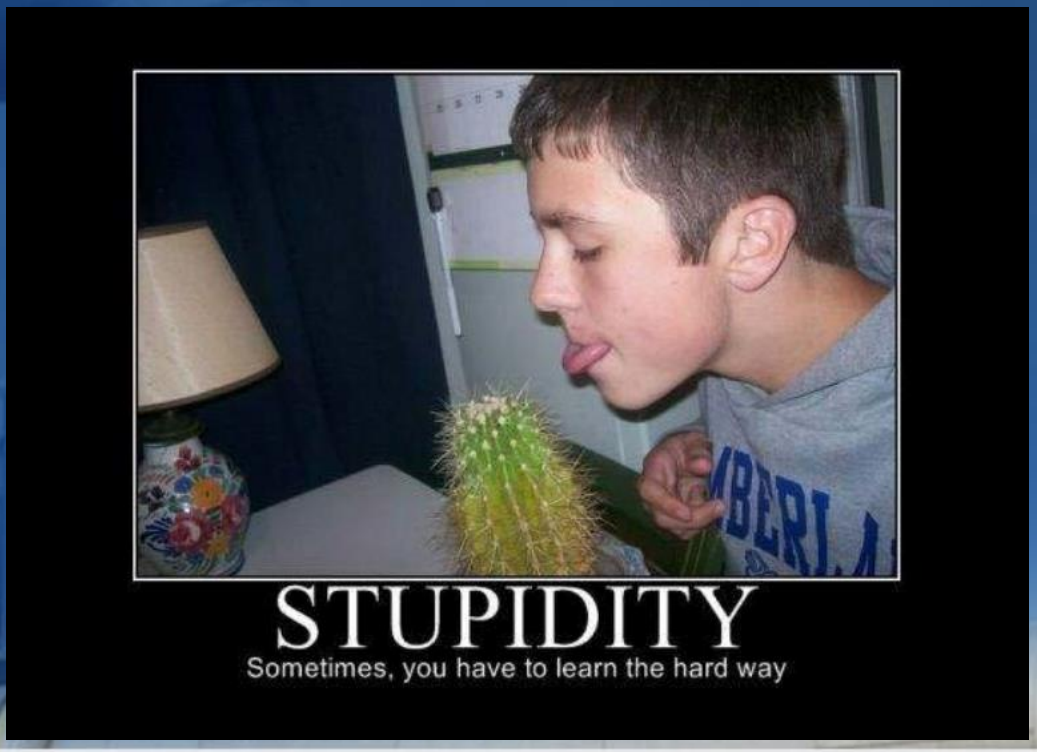
10) What is the major hazard from confined space with acid tank ?

Conclusion

Sulfuric acid is a liquid that causes visible destruction and irreversible alteration in human skin or eye tissue.

Remember!!! It takes <u>Patience</u> And <u>Wisdom</u> to stay safe





Thanks !!!!!

Gestion responsable[MD]
Notre engagement envers le développement durable.

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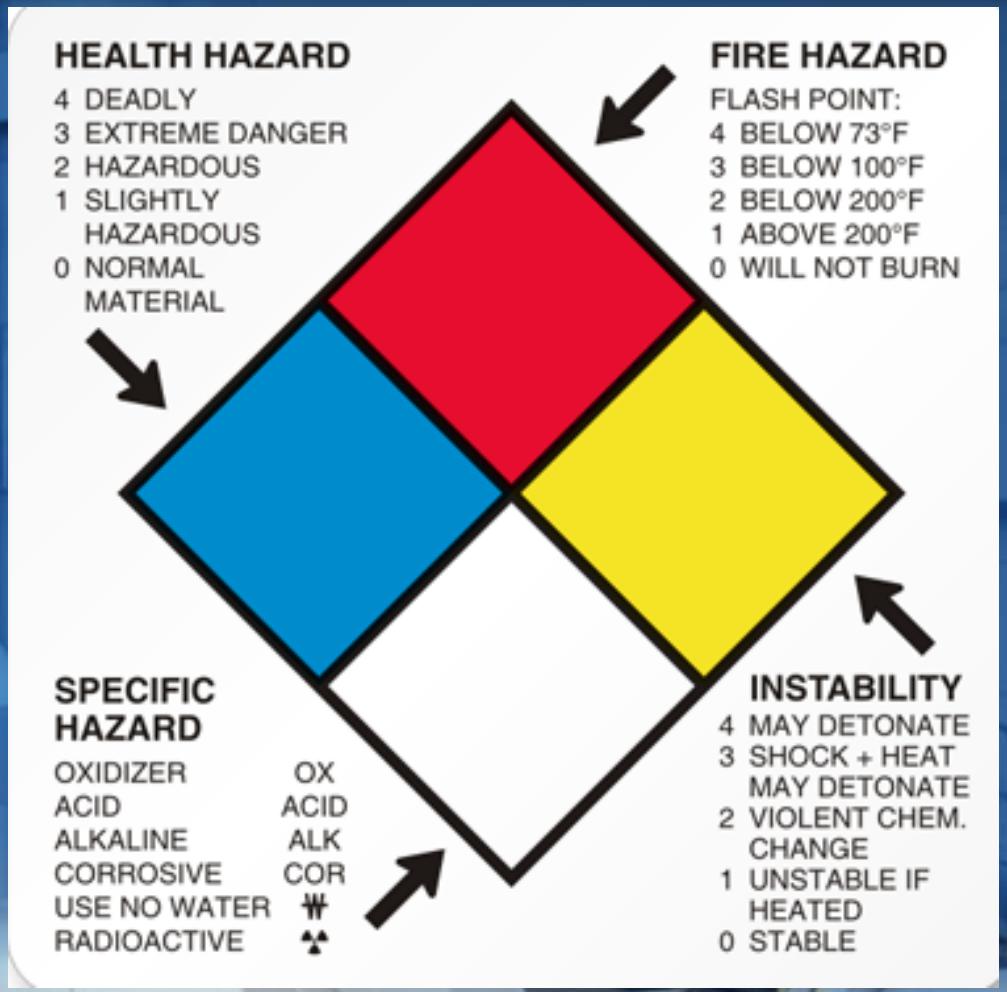
	**Bombe explosant** (pour les dangers d'explosion ou de réactivité)		**Flamme** (pour les dangers d'incendie)		**Flamme sur un cercle** (pour les matières comburantes)
	**Bouteille à gaz** (pour les gaz sous pression)		**Corrosion** (peut être corrosif pour les métaux ainsi que la peau ou les yeux)		**Tête de mort sur deux tibias** (peut être toxique ou mortel après une courte exposition à de quantités)
	**Danger pour la santé** (peut avoir ou est présumé avoir de graves effets sur la santé)		**Point d'exclamation** (peut entraîner des effets moins sévères sur la santé ou couche d'ozone)		**Environnement*** (peut être nocif pour le milieu aquatique)
	**Matières infectieuses présentant un danger biologique** (pour les organismes ou les toxines susceptibles de causer des chez l'humain ou chez l'animal)				

* Le SGH établit également un groupe de dangers pour l'environnement. Ce groupe et les classes qui le régissent n'ont pas été adoptés dans le SIMDUT 2015. Cependant, les différentes classes liées à l'environnement peuvent figurer sur les étiquettes et les fiches de données de sécurité (FDS). Le SIMDUT 2015 permet de fournir des renseignements concernant les dangers pour l'environnement.



Acide sulfurique H2SO4

L'acide sulfurique H2SO4 est le plus déshydratant, dessicant. Il donne des nécroses noires ou brunâtres, sèches, dures et indolores. La réaction exothermique est forte. Il existe un risque de passage systémique avec oedème de glotte et état de choc