Maritime transport of copper concentrates
- IMO regulations -

ICSG meeting, April 2015
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Agenda

- Relevant regulations of the International Maritime Organization
- Transport of copper concentrates versus Marine Pollution (Marpol annex V)
- Transport of copper concentrates versus Safety of Life at Sea (SOLAS)
- Conclusions

MARPOL = Marine Pollution; HME = Harmful to the Marine Environment;
SOLAS = Safety of Life at SEA; MHB = Materials Hazardous only in Bulk;
IMDG = International Maritime Dangerous good code
IMSBC = International Maritime Solid Bulk Cargoes code
Relevant regulations of the International Maritime Organization - 1973 onwards

MARPOL (Marine pollution)
SOLAS (Safety of Life at Sea) – mandatory

SOLAS - Safe transport of Dangerous Goods
- Goods classified as “Dangerous Goods” have packaging/containers requirements described in International Maritime Dangerous Goods code (IMDG) – Mandatory since 2004

SOLAS - Safe transport of bulk cargoes
- Goods classified as “Material Hazardous only in Bulk” need safety measures - to be integrated into the International Maritime Solid Bulk Cargoes code (IMSBC). Mineral concentrates and Metal sulphides
- Hazards: Group A: liquify (moisture content); Group B: chemical hazards (self-heating, flammability, oxygen depletion and formation of dust)

Relevant recent regulations of the International Maritime Organization 2013 onwards

   - Cargo residues, classified as “Harmful to the Marine Environment (HME), can not be discharged into the sea. Dry residues and/or wash water have to be discharged at “adequate port reception facilities”

2. Safety of Life at Sea-SOLAS (mandatory): Bulk cargoes safety – Jan ‘15
   - Extended group B criteria for “Material Hazardous only in Bulk” (MHB) - to be integrated into the International Maritime Solid Bulk Cargoes code (IMSBC)
Transport of copper concentrates and Marine Pollution prevention (MARPOL annex V)

Marine Pollution - Marpol Annex V

Criteria for “Harmful to the Marine Environment”

- Acute Aquatic Toxicity Category 1; and/or
- Chronic Aquatic Toxicity Category 1 or 2; and/or

- Carcinogenicity Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation*; and/or
- Mutagenicity Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation*; and/or
- Reproductive Toxicity Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation*; and/or
- Specific Target Organ Toxicity Repeated Exposure Category 1 combined with not being rapidly degradable and having high bioaccumulation*; and/or

* via oral and dermal exposure

- Solid bulk cargoes containing or consisting of synthetic polymers, rubber, plastics, or plastic feedstock pellets

Not relevant for concentrates

Jan 2013

Jan 2015

Not relevant for concentrates
Copper concentrates identity
.....relevant to MARPOL

Copper concentrates are composed of metal-sulphides, minerals and gangue:
- Metals are present in mineral matrix – sparingly soluble
- Variable mineral and elemental composition
- Within one ore-body, composition may change over time

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<th>Max</th>
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Hazards?

General principles for hazards of concentrates-MARPOL

Presented at IMO meetings 2013-2014

Guidance documents: GHS 2011 4th rev incl Annexes 9 & 10

For sparingly soluble materials (eg concentrates), metal concentrations alone are not determining the hazard of the concentrate.

Metal ions need to be released to become “bio-available” and cause “ecotoxicity” and/or “human health hazards after oral/dermal exposure”.

Assess the toxicity/ecotoxicity from:

- Hazards from metal ions for aquatic organisms (human health) - existing info
- The release of metal ions from the concentrates - research
- Fate of the metal ions in the water column (metal removal rate and bio-accumulation) - existing info and research
Marpol Annex V HME compliance assessment

Approach developed, described and presented (2013-2014)

Methodology for assessing hazards of metal concentrates
http://www.icmm.com
• Hazard assessment of ores and concentrates for marine transport

Research briefings for copper concentrates
http://www.copperalliance.eu
• Copper concentrates HME detailed briefing

A multi-metal classification tool for complex materials - MECLAS
http://www.meclas.eu/
Tier 0: Considered the only the elemental composition (consider all soluble)
Tier 1: Consider the use of chemical speciation and/or mineralogy
Tier 2: Consider the use for classification information from Bio-elution (human health) and Transformation/dissolution (Environment)

Compliance checking for copper concentrates
- company needs to input A + B, or C

A: Company analysis of mineral composition
B: Company analysis of chemical elements
C: Company own transformation/dissolution /bioelution testing
Public metals classification repository - MeClas
MEASUREMENT of metal release
MECLAS provides classification, plus justification for use by shipper

CALCULATION of metal release
Process data through Copper Alliance model
Assessment of concentrates through MECLAS

www.icmm.com

Outcome and results for copper concentrates

4, out of 140 assessed concentrates assessed, merit HME classification

Primarily driven by:

• High chalcocite content (> 28%)
• Minor elements

➢ Declare the hazards through shipper declaration/safety data-sheets

Next step : full acceptance of the approach and data
Marpol Annex V HME implementation

2014 – 2015 discussions at IMO

Sub-Committee on Carriage of Cargoes and Containers – Sept 2014

• ICMM/ECI presentation and discussion on the implementation
• Outcome of the correspondence group in HME/none HME lists

Recommendations to Marine Environmental Pollution Control (MEPC) ...(May 2015)

• No HME/non HME lists to be developed.
• HME criteria and the requirement for a shipper’s declaration stating whether a cargo is HME or not to be moved into the mandatory MARPOL Annex V
• Non-mandatory inclusion of the HME status in IMSBC
  
  o Develop guidance for the application of GHS for classification of solid bulk cargoes as to whether or not they are HME

Transport of copper concentrates and Safety Of Life at Sea (SOLAS)
Safety of life at Sea
International Maritime Solid Bulk Cargoes code (IMSBC)
Materials Hazardous in Bulk only (MHB)

Solid Toxic (human hazards)
- Bio-accessibility research: Bio-elution/respirable fraction
- Extension of MECLAS

Physico-chemical criteria
- Research
  - Combustible Solids
  - Self-heating Solids
  - Solids that evolve into flammable gas when wet ….
  - Solids that evolve toxic gas when wet ….
  - Corrosive to metals …Ongoing

- Acute Toxicity inhalation Cat 4
- STOT-SE inhalation Cat 1
- STOT-RE inhalation Cat 1
- Acute Dermal Cat 4
- STOT-SE Dermal Cat 1
- STOT-RE Dermal Cat 1
- Carcinogenic Cat 1A or 1B
- Reprotox Cat 1A or 1B
- Respiratory Sensitization Cat 1
- Skin Corrosion/Irritation Cat 2
- Serious Eye Damage Cat 1
- Eye Irritation Category 2

International Maritime Solid Bulk Cargoes code (IMSBC)
Materials Hazardous in Bulk (MHB)
compliance tools and outcome

SOLAS - MHB Assessment status for copper concentrates
- MECLAS outcome for “toxic solids”:
  Some of the concentrates MHB-group B
  Lead is the driver for the classification
- Industry MHB briefing note on MHB compliance
- Questions on the application of the UN protocol for corrosivity of liquids to solids

- Apply existing schedule (Metal-sulphide OR Mineral concentrate)
- Declare the hazards through shipper declaration/safety data-sheets

New Schedule proposed by Australia (to be discussed in Sept ‘15)
- Class 8 corrosive solid –UN 1759
  …versus …industry experience (not corrosive)
  Corrosivity research demonstrates methodological deficiencies - ONGOING
Conclusions and next steps

MARPOL annex V – Harmful to the Marine Environment (HME)
- Methodology, research data and MECLAS tool available
- Assessment done for >100 concentrates: only few are HME, mainly related to chalcocite content
  Next step: acceptance of the methodology and data by MEPC (May 2015)

SOLAS – International Maritime Solid Bulk Cargoes (IMSBC)
- Methodology, research data (ongoing) and MECLAS tool available
- Some concentrates are MHB due to lead (reproductive toxicity) – toxic solid criterium
- Remaining issue: methodology for corrosivity – under research
  Next step: New/revised IMSBC schedules to include the new criteria
  “Corrosivity” … to Sept’15 CCC meeting (Carriage, Cargoes and Containers)

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Thanks… have a safe journey