

EUROMETAUX CHEMICALS MANAGEMENT NEWS



Please join us in :

- 1 September: Chemicals Management Steering Committee
- 19-23 September: Chemicals Management Autumn Week
- 20 September: Industrial Emissions Taskforce
- 21 September: MEED Workshop
- 28 September: Risk Management Taskforce
- 29 September: CSS Project Group
- 30 September: Environment Taskforce

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Dear All,

The second part of July turned out to be quiet(er).

Even if some chemicals management topics further flirted with the temperatures (e.g., the lead or lithium classifications, Commission's latest idea on intermediates); the expected slowdown of the agendas and emails came and with it, longer periods of non-interrupted working time.

For more than 3 months, I have been eagerly anticipating these moments to (finally!) accomplish some in-depth reflection and become incredibly strategic. Even if the latter probably requires some longer lunch breaks and/or cocktails.

There were enough topics in my "summer bag" to concretise this: the identification of priorities for the REACH review, the drafting of an action plan for a Zero Pollution/Harm Roadmap, the conception of a guidance on grouping that would not be rejected, finding a trick to have the metals assets considered "by default" by authorities. The question was rather where to start. And how?

A possibility would have been to use all the smartboards in Eurometaux's empty offices and do a huge mind mapping exercise (sure my colleagues would have appreciated!) or sitting in full lotus position to meditate and "try" to digest the learnings of the last months.

I could also walk energetically through the Parc du Cinquantaire to measure the distance separating us from DG ENV (with a comfort ice-cream) or even have a complete change of settings. I tried the last one by spending a couple of days at the Avignon theatre festival but ran away when I realised that the one of the most recurring themes was climate change (with "dark side" lobbyists playing the baddies).

Hmm...I needed a 'concept'.

What about setting up a new survival reality show? Something like "I'm a HLRT celeb...Get Me Active Here!", scenarised by our own MSE (Metals So Essential) studios and aired on CARACAL TeeVee? The format would see a group of chemicals management celebrities meeting together in extreme conditions with few comforts (e.g., bad connexions, Borschette coffee, interrupted speaking times, no phones, etc.). As "HLRT", they represent all spheres: from authorities up to academics, including industry and NGOs. Each celeb undertakes challenges to test a series of Zero Pollution solutions to secure a workable implementation and additional credibility for the group, and to avoid being voted out by the viewers during their stay, with the final episode's votes nominating the winning solution.

Finding challenges was not really the difficulty here!

For example, a first one could be taking a selfie while skydiving from a 'haveyoursayconsultation' website to the marketing branch of a SME AND explaining the new SSbD requirements.

A second one could be to rearrange -at night- the desks in the Commission buildings to ensure that coherence between the different Green Deal objectives becomes a mandatory topic at the coffee machine (this will require additional work on the quality of the treat delivered by the machine).

A third one could involve an industry celeb who must draft paragraphs of a new regulation while a crowd of MEPs, NGOs and media are continuously shouting that it will kill more people.

Finding viewers/voters will be easy if we rely on the huge Brussels community keen to give opinions and raise additional hurdles.

The first struggle will probably be constraining these HLRT celebs to realise that teamwork will be key to survival and that the dynamics will have to change: hugs to replace the bashing, listening to each other's fears and sharing tools in the jungle to confront the wild Regulatory Scrutiny Boarders.

Tempted?

First episode end of August?

Violaine Verougstraete

COMMISSION

CARACAL-45: experiencing REACH and CLP in vivo again

CARACAL-45 took place on 5 and 6 July in hybrid format, allowing to rediscover the charms of the Borschette building. The first day was devoted to CLP, providing an update on the legal procedures and timing associated with the CLP revision. The Commission explained that two procedures will be followed, i.e., the ordinary legislative procedure for the amendment of the CLP articles and the delegated acts route for adding new hazard classes. With regard to the latter, a draft delegated act should be uploaded soon for a 4-week consultation before being further discussed in ad hoc CARACAL meetings in autumn. Progress is made on the legal text in parallel, now that the Regulatory Scrutiny Board has provided its feedback on the impact assessment. Several Member States expressed concerns on the proposed delegated act procedure as they believe the changes in hazard classes relate to essential elements of the legislation and imply policy choices.

Commission provided a short update on the proposal the EU would make at UN GHS level, to launch work in the coming biennium on EDs, PBTs, PMTs and later on the immunotoxicity, neurotoxicity and terrestrial endpoints.

Key item of the CLP session was the discussion on the 21st ATP, including the entries on lead metal and lithium salts. Steve Binks (ILA) and Francesco Gattiglio (Albemarle) both made short and efficient presentations, recalling the key issues at stake. Several Member States made some comments in follow-up and all CARACAL participants can submit comments until 31 August.

The REACH session was quite intense, starting with an update on the revision process timelines before diving into the 'intermediates' issue. The discussion highlighted an issue that requires careful monitoring: Commission is indeed proposing to link the exemption from Authorisation/Restriction to strictly controlled conditions (SCC). Considering the difficulty to meet SCC as defined in the ECHA guidance, this proposal can have significant consequences. Comments will be prepared by the sector to stress e.g., that such a change should be covered by an impact assessment.

The main part of the day was however devoted to the reform of the REACH Authorisation and Restriction system, and the paper uploaded by Commission ahead of the meeting. This paper brings together a number of elements discussed before, like the 3 possible options (option 1: keeping the same principles but simplifying details, option 2: merge Authorisation and Restriction into one system, option 3: only restrictions), the Generic Risk Assessment (GRA) and the Essential Use Concept (EUC). Each of the options was discussed and heavily commented by the CARACAL audience. The debates allowed to get useful clarifications on how Commission wants to possibly write the amendments to the REACH legal text, but 'the music and how to play it' will still need to be defined. Key issues in this context are derogations, the assessment of the availability of alternatives and the criteria that will be handled (e.g., for essential uses, for prioritisation etc.). Due to the tight timeline for submitting the Impact Assessment to the regulatory Scrutiny Board, no comments can be submitted on the Commission paper.

Other topics discussed that day included indicators under the Chemicals Strategy for Sustainability (CSS), nanomaterials and substance identification. EEB presented a preview of the 'Need for Speed' report they have published in which they analysed the timelines for REACH and CLP processes, concluding that it takes far too much time to ban hazardous chemicals of the EU market. Commission, Member States and industry were all specifically targeted in the presentation, leaving an uncomfortable feeling to conclude the day...and highlighting the need to take a break.

Eurometaux's notes were circulated to the CARACAL Taskforce on 8 July (more information: Violaine Verougstraete).

OTHER

EU RoHS revision: proposal delayed

The European Commission has delayed the publication of its proposal on the revision of the EU's Directive on the restriction of hazardous substances (RoHS) in electrical and electronic equipment (EEE) to -most probably- Q2 2023, with the RoHS 3 planned to be agreed upon end of 2024 and coming into force in 2027. This delay is due amongst others to the fact that the Commission is considering other processes underway, including the REACH review (delayed to Q1 2023) and the recently presented legislative proposal for a Regulation on ecodesign for sustainable products.

In March, the Commission launched a Public Consultation on the review, which puts forward major changes to the Directive, including the option to change it into a Regulation. Early July, several members participated in targeted interviews with Ramboll and Öko-Institut, charged by Commission to perform a "Study to support the assessment of impacts associated with the general review of Directive 2011/65/EU (RoHS)". The

discussion was constructive and allowed to discuss key aspects like communication/interaction, transparency, timelines, socio-economic analysis, the importance of risk and exposure, recycling etc.).

A big thank you to Caroline, Bernard, Tom and Georg who made time available for this (more information: Caroline Braibant and Violaine Verougstraete).

EUROMETAUX CHEMICALS MANAGEMENT

CARACAL Taskforce Meeting: 1 July

On 1 July, the sector prepared the CARACAL meeting by discussing the now traditional Master Document, which lists the items to be discussed during the REACH and CLP sessions and summarises the documents made available on CIRCABC ahead of the meeting. It also uses a colour code -for debate- to highlight the relevance and importance of the topic for the sector. These preparatory sessions with the CARACAL Taskforce are crucial to identify the possible concerns of the sector and draft the interventions to be made. They also allow to have a better and more complete understanding of the multiple papers that are posted-often late- in view of the meeting. Thank you for your participation and input.

CHEMICALS STRATEGY FOR SUSTAINABILITY

CSS: Cefic and Eurometaux started an alignment process: on key principles and common issues to defend for the REACH review

Cefic and Eurometaux's Chemicals Managements staff started to identify the key principles and common issues the sectors want to collectively defend during the REACH-2.0 drafting process by the Commission. The idea is to select a limited number of high-level, crucial principles and common issues we should fight for during the whole REACH-2.0 drafting and policy approval process. This set will evidently be complemented with sector-specific aspects (e.g., polymers registration for Cefic or risk control and specific Mixture Assessment Factor (MAF) concerns for inorganics for Eurometaux).

A first brainstorming identified: a) *a clear focus on what really matters, a transparent selection and follow-up system allowing appropriate interaction between stakeholders, regulators and scientists, b) a smart data/information system built on One Substance One Assessment (OSOA) and a proportional use of existing evidence to decide on data gaps/needs/risk management.* These key principles result in the need for a risk-based prioritisation system for evaluation and risk management, for an integrated workplan and an efficient and effective risk management system, all supported by transparency, recognition of use/supply chain specificities and of the other Green Deal objectives like circularity and climate as well as strategic autonomy.

Both Cefic and Eurometaux will draft a short concept paper on the common key principles and issues, to be compared and presented to the membership for assessment and comments. The aim is to have these documents ready for advocacy before the Regulatory Scrutiny Board provides its report to the Commission on the REACH Review impact assessment (more information: Hugo Waeterschoot and Violaine Verougstraete).

Safe & Sustainable by Design (SSbD): framework report released by DG RTD

Overlaps and intersections between sustainability and chemicals management

The Joint Research Centre (JRC) Technical Report "*Safe and sustainable by design chemicals and materials - Framework for the definition of criteria and evaluation procedure for chemicals and materials*" was published on 15 July. According to DG RTD this represents an important milestone as a technical input for the SSbD framework. The report is available online [here](#).

SSbD is defined in the CSS as "*a pre-market approach to chemicals that focuses on providing a function (or service), while avoiding volumes and chemical properties that may be harmful to human health or the environment, in particular groups of chemicals likely to be (eco) toxic, persistent, bio-accumulative or mobile. Overall sustainability should be ensured by minimising the environmental footprint of chemicals in particular on climate change, resource use, ecosystems and biodiversity from a lifecycle perspective*". The aim of the SSbD framework is to support the design and development of safe and sustainable chemicals and materials with research and innovation activities. The report proposes dimensions, aspects, methods and indicators that can be used to assess chemicals and materials and how criteria can be defined.

Eurometaux Chemicals Management and Sustainability teams have analysed the report (on which comments are not invited as there was a previous commenting phase earlier this year).

The main points to highlight at this time are:

- SSbD is an innovation approach and not a regulatory tool.
- "Safe and sustainable" is intended to be in absolute terms and not relative i.e., not "safer and more sustainable"
- The framework has a stepwise approach to assess whether chemicals and materials are considered SSbD or not. The combination of the hierarchy used (where safety is placed before sustainability) and the stepwise approach for the safety assessment means that SSbD is not truly a "full lifecycle" approach, as many substances and materials will be ruled out of the full SSbD evaluation based on the safety assessment only, and the sustainability assessment will not be carried out.
- This is because the first safety assessment "hurdle" is intrinsic hazard, with no consideration of risk and exposure. With respect to hazard, chemicals and materials that meet the definition of Most Harmful Chemicals (MHCs) will be "cut off" and excluded from further assessment. Chemicals and materials that do not meet this definition but meet the definition of Substances of Concern (SoCs) will be further assessed but should be substituted as far as possible or re-designed in order to reduce their adverse effects.
- The approach with "cut offs" and the focus on hazard are going to rule out a very large number of chemicals and materials at a very early stage, thus decreasing hugely the size of the innovation "toolbox". This could also result in regrettable substitution as the sustainability assessment will not be carried out.
- To have a good performance on one SSbD criterion (e.g., sustainability) compensating for a poor performance in another criterion is not allowed.
- In order to decide if a given chemical / material is SSbD or not, it is necessary to take the use into account and perform a lifecycle assessment (LCA). If there are several uses and / or the chemical can be produced using different routes, several LCAs will be needed.

There are planned case studies which are going to be key in highlighting whether or not some of the issues above are problematic for the application of the framework. There will be three studies, all relating to organics / plastics. The JRC will continue the development of the announced case studies. A dedicated workshop will take place in late 2022 / early 2023 in which the outcome from these case studies will be presented and discussed (more information: Simon Cook and Kamila Slupek).

CLASSIFICATION

Lead and lithium classifications: *further mobilising MSCAs*

CARACAL members can send comments on the proposed entries in the 21st Adaptation to Technical Progress (ATP) until 31 August (see also under Commission).

Despite the summer break not being an optimal period to contact MSCAs and explain our concerns with the classifications, it remains crucial to acquire some further inputs that may encourage the Commission to not simply take over the RAC opinions on lead metal (environment) and the three lithium salts.

On lithium, France commented during the CARACAL meeting, that they would assess the Boyle study, spotted by the UK HSE along their literature review in view of preparing UK's opinion on the classification. This study has been missed by the Dossier Submitter, RAC and industry. Germany indicated that, although they recognize the economic and strategic importance of the 3 salts and the conflict created between chemicals management and other targets, a classification should not be subject to a political discussion and socio-economic considerations. They do not consider that the Boyle study is robust enough to justify sending the opinion back to RAC. They announced they would send further comments as well. Bulgaria, Finland and Slovenia stressed that the classification should be handled carefully and would prefer to have the Boyle study reviewed and the data re-evaluated. Several authorities continue to state that 'a classification is only a classification', convinced that the consequences can be handled easily in the downstream legislations (from REACH to Seveso, transport etc.). This is ignoring the fact that some consequences, e.g., on transport or environmental permits by their severity are directly conflicting with e.g., circularity objectives but also that classification has in fact become a risk management tool. A classification is in fact only a "preamble" as it makes a substance become "of concern", "most harmful chemicals" on top of being identified potentially as a Substance of Very High Concern (SVHC). The Li industry, supported by its associations, has written a letter to Commission to explain that an unjustified lithium salts classification will be a red flag that will bring great uncertainty to companies looking into making long-term investments into European refining and recycling capacity, risking delays or different investment decisions towards competing markets. The letter

and the CARACAL discussions have attracted welcomed media attention and hopefully, this will allow the possibility of having a discussion on how to increase coherence between objectives.

On lead, France, Austria, Bulgaria, Italy, Slovenia, Portugal made some comments in favour of the one or the other option proposed in the RAC opinion (single entry for massive/powder or double entry). The Netherlands indicated that they would send some written comments. In follow-up the French federation a3M has organized a very useful exchange with the French Direction Générale des Entreprises to highlight the significant impacts on transport and recycling in companies and explain the technical approaches followed by RAC in the case of lead, compared to other metals.

For both Pb and Li, an additional discussion with CARACAL is planned for the autumn. The respective Taskforces will be reconvened once the commenting deadline has passed to take stock of the situation and define further actions where relevant (more information: Francesco Gattiglio, Steve Binks, Jasim Chowdhury, Hugo Waeterschoot and Violaine Verougstraete).

REACH REGISTRATIONS

Access to chemicals data for safety assessments: *Call for evidence and online questionnaire*

Last month we informed you about the new European Commission initiative “Chemical safety – better access to chemicals data for safety assessments” which aims to improve access to available chemicals data and generate a common scientific base to be used for risk assessment across various regulatory frameworks.

As first step, a [call for evidence](#) (open until the 16 August) has now been launched. The initiative is certainly welcome and in line with the One Substance One Assessment (OSOA) principle that Eurometaux has been advocating for a while. With the support of the Registration Taskforce, we are planning to respond to the call, to draw attention on several elements quoted in the background document that are considered to be crucial, including: notification mechanisms to inform authority about news studies, data standards and formats, protection of data owners’ rights, and data quality. Additionally, we are also beginning to work on the response to an [online questionnaire](#) (open until the 25 September) launched in parallel. Inputs collected from both the call for evidence and the questionnaire will be used to feed a study commissioned by the European Commission to support the preparation of a legislative proposal on the re-use, dissemination and flows of chemicals data.

This matter will be further discussed with the Registration & Maintenance Taskforce, notably at the next meeting planned for 14 October (more information: Violaine Verougstraete, Federica Iaccino, Lorenzo Zullo).

INDUSTRIAL EMISSIONS

Industrial Emissions Directive: *update*

On 12 July at the European Parliament, ENVI presented the proposals for amending the Industrial Emissions Directive (IED) and the Industrial Emissions Portal. A summary of the debate was circulated to the Industrial Emissions Taskforce and Eurometaux will start its outreach activities, making use of a position paper, [submitted in the open public consultation](#) and a table with proposed amendments. The objective of the outreach will be to establish a channel of communication to provide MEPs with our positions and requests. A more detailed action plan was circulated to the Industrial Emissions Taskforce.

The next meeting of the Taskforce will take place on 20 September 2022 (more information: Lighea Speziale, Lorenzo Ceccherini and Lorenzo Marotti).

Air Quality: *update*

In 2021 Eurometaux presented the possibility to launch an Air Quality project aiming at evaluating the impact of industry stack and fugitive emissions on human exposure and health by quantifying factory emissions’ attributable fraction to ground level concentration levels, population attributable exposure fraction and health impact by using the Burden of Disease (BoD) concept accepted by WHO and the EEA. A pre-study (feasibility) study highlighted the possible difficulties associated with the collection of the available data, their format and the possible identification of specific sites in the study.

To demonstrate how the data and information collected could be used, and what type of results can be expected, Eurometaux and ARCHE used a case example, presented at SETAC 2022 Copenhagen.

The political pressure on industrial emissions and on industry being able to demonstrate knowledge of these impacts seems to be on the increase (e.g., <https://www.eea.europa.eu/highlights/pollution-and-cancer>). Also the Commission

adoption of the legislative proposal on Air Quality is expected by the end of 2022, with the Council discussion planned to start early 2023. Finally, Commission is expected to release its third 'Clear Air Outlook Report' by the end of 2022.

To ensure that we will be able to launch the project, it is proposed to start the project using default data to build an emission inventory (using the E-PRTR, EMEP/EEA air pollutants emission inventories and public literature). In a second part, a default meteorology will be used to calculate dispersion of the pollutants, and a reasonable worst-case population density will be used to estimate population attributable exposure fractions and health burden by using existing exposure response functions from literature. At a later stage, the emissions inventory can be refined according to the data provided by members. More details have been circulated to the ZPAP Project Group (more information: Joonas Koivisto and Lorenzo Marotti).

MISA

MISA final evaluation report: *justifying efforts*

ECHA will soon publish its final evaluation report of the MISA program, coinciding also with the retirement of the two key ECHA persons who helped to set it up and run it, i.e. Jack de Bruijn and Jos Mossink. The ECHA report will be published on the ECHA website to make it accessible to the authorities (to justify the resources ECHA has injected in the program), the Member States and other stakeholders. The draft report was shared by ECHA and circulated to the MISA community for comments. A big thanks to those who kindly took the time to review it!

The report explains that in total 29 consortia/associations committed to the activities agreed in the Rolling Action Plan, resulting in the inclusion of more than 340 metals, metal and inorganic compounds in MISA, 'covering a majority of the volume of metal and metal compounds on the EU market'. It also highlights usefully that at the end of the programme about 60% of the substances in MISA were updated at least once on human health and environment endpoints, significantly more than for other non-MISA substances.

As the report details the different activities, the learnings, the agreements but also where those could not be met, the section of the report on the rapid removal issue is disappointing, in line with the conclusions of the two workshops we had. However, to cover our concern that the text seems to close the door to the use of best science, ECHA included a sentence to indicate that industry made a request that a case-by-case approach on a scientific basis should be possible. Once published, the report will also be posted on the REACH Metals Gateway/MISA blog (more information: Federica Iaccino, Hugo Waeterschoot and Violaine Verougstraete).

WATER

Environmental Quality Standard Directive (EQS) review: *last version for Nickel*

A last version of the nickel draft EQS dossier was sent to the (recently formed) sub-group of experts for final comments in early July. The dossier was then presumably forwarded to Scientific Committee on Health, Environmental and Emerging Risks SCHEER for their opinion (the members of Working Group (WG) Chemicals were not informed of this).

Interestingly, the SCHEER appears to be preparing a synthesis opinion document summarising the findings on all substances and suggesting how the preparation of the dossiers could/should be improved in light of the concerns that were raised during the process. This document is not yet ready. It will follow once all substances have been addressed by the SCHEER. It would be interesting to have this document and refer to it (depending of course on its content) in the next part of the advocacy related to this EQSD review.

Dates to mark in your calendars:

- Next WG Chemicals: 5 - 6/10/2022 (hybrid)
- Next meeting of the Strategic Coordination Group (SCG): 27/10/2022
- Discussion on the Integrated water management - revised lists of surface and groundwater pollutants of the college agenda of the EU commission: 26/10/2022

Diffuse emissions: *request for comments*

We have received a request for comments on the "ETC ICM Draft Technical Report - Quantification of Emissions to Water". This report was prepared by the EEA and discussed at the level of WG Chemicals. Representatives from Eurometaux have followed these activities closely and provided some data. We have been asked to review the draft report and respond to the consultation questions (the consultation runs until 7 September 2022). Eurometaux will prepare a response to this consultation together with the experts who represented EM during this work on emissions in water.

Watch list 2022 adopted and published

On 22 July, the European Commission adopted and published its 2022 revised surface water [Watch List](#).

(more information: Lara Van de Merckt)

IMPORTANT: Note from Lara: "This is my last CM News article for a while. I wish you all a lovely end of summer and send you strength for the coming months of intense but surely interesting work!"



CALENDAR

Please find here below a non-exhaustive list of the meetings that are planned for Q3 – Q4 2022.

For meetings at Eurometaux

Most of our meetings will now be held as hybrid meetings, and **our members will be informed ahead of the meetings** (links to join will be sent ahead of the meetings).

For meetings at ECHA: this information is published on ECHA's [website](#)

- 18-19 August: ECHA RAC-62 REST WG
- 22-24 August: ETAP meeting attended by Eurometaux as an observer
- 30 August: [Zero Harm/Sustainable Roadmap Working Group](#)
- 1 September: [Chemicals Management Steering Committee](#)
- 05-09 September: ECHA RAC-62 Plenary (reserve) & SEAC-56
- 12-16 September: ECHA RAC-62 Plenary & SEAC-56
- 15 September: OECD PRTR mid-year review
- 19-22 September: [Chemicals Management Autumn Week](#)
- 20 September: [Industrial Emissions Taskforce](#)
- 21 September: [MEED Workshop \(Sponsors only, items to be defined\)](#)
- 26 September: Chemical Watch conference with Eurometaux contribution on CSS [Event Listing | Regulatory Summit Europe 2022 | Events & Training \(chemicalwatch.com\)](#)
- 29-30 September: ECHA MB
- 28 September: [Risk Management Taskforce](#)
- 29 September: [CSS Project Group](#)
- 30 September: [Environment Taskforce](#)
- 05-06 October: Working Group Chemicals Meeting (hybrid)
- 14 October: [Registration Taskforce](#)
- 10-14 October: ECHA RAC-63 AfA WG
- 10-14 October: ECHA MSC-79
- 24-28 October: ECHA RAC-63 CLH WG
- 26 October: Commission: Discussion on the Integrated Water Management
- 27 October: Strategic Coordination Group Meeting
- 3-4 November: ECHA RAC-63 REST WG
- 16-17 November: CARACAL Meeting (TBC)
- 22 November: [MEED Workshop \(Sponsors only\)](#)

- 28 November – 02 December: ECHA RAC-63 Plenary & SEAC-57
- 05-09 December: ECHA SEAC-57
- [06 December: Chemicals Management Steering Committee](#)
- 07-09 December: ECHA RAC-63 Plenary (reserve)
- 12-16 December: ECHA MSC-80
- 15-16 December: ECHA MB
- [20 December: Risk Management Taskforce](#)

GENERAL INFORMATION & ACRONYMS

Follow the logo and check out our new Metals Gateway website.



This website is a one stop information source for regulators & risk assessors dealing with metals/metal compounds and is tailored to the specific needs of the metals industry sector.

A continuously updated list of acronyms is available under the [Reach Metals Gateway \(RMG\)](#)



I: Test your metal knowledge

1. In the Alkali Metals, which of the following is included?
 - a. Antimony
 - b. Silver
 - c. Lithium
2. Which is the largest set of elements in the periodic table?
 - a. Actinides
 - b. Transition Metals
 - c. The Carbon Group
3. What does the Greek word Molybdos mean?
 - a. Molybdenum
 - b. Lead (miners once mistook this Mo ore for Pb)
 - c. Platinum
4. Which metal can melt in your hand?
 - a. Gallium
 - b. Indium
 - c. Boron
5. Which is the densest metal?
 - a. Iridium
 - b. Rhodium
 - c. Osmium
6. Which metal has the highest melting point?
 - a. Tungsten
 - b. Palladium
 - c. Vanadium
7. Which of these metals is found in emerald?
 - a. Strontium
 - b. Beryllium
 - c. Scandium
8. How many metals are named after scientists?
 - a. 10
 - b. 27
 - c. 15

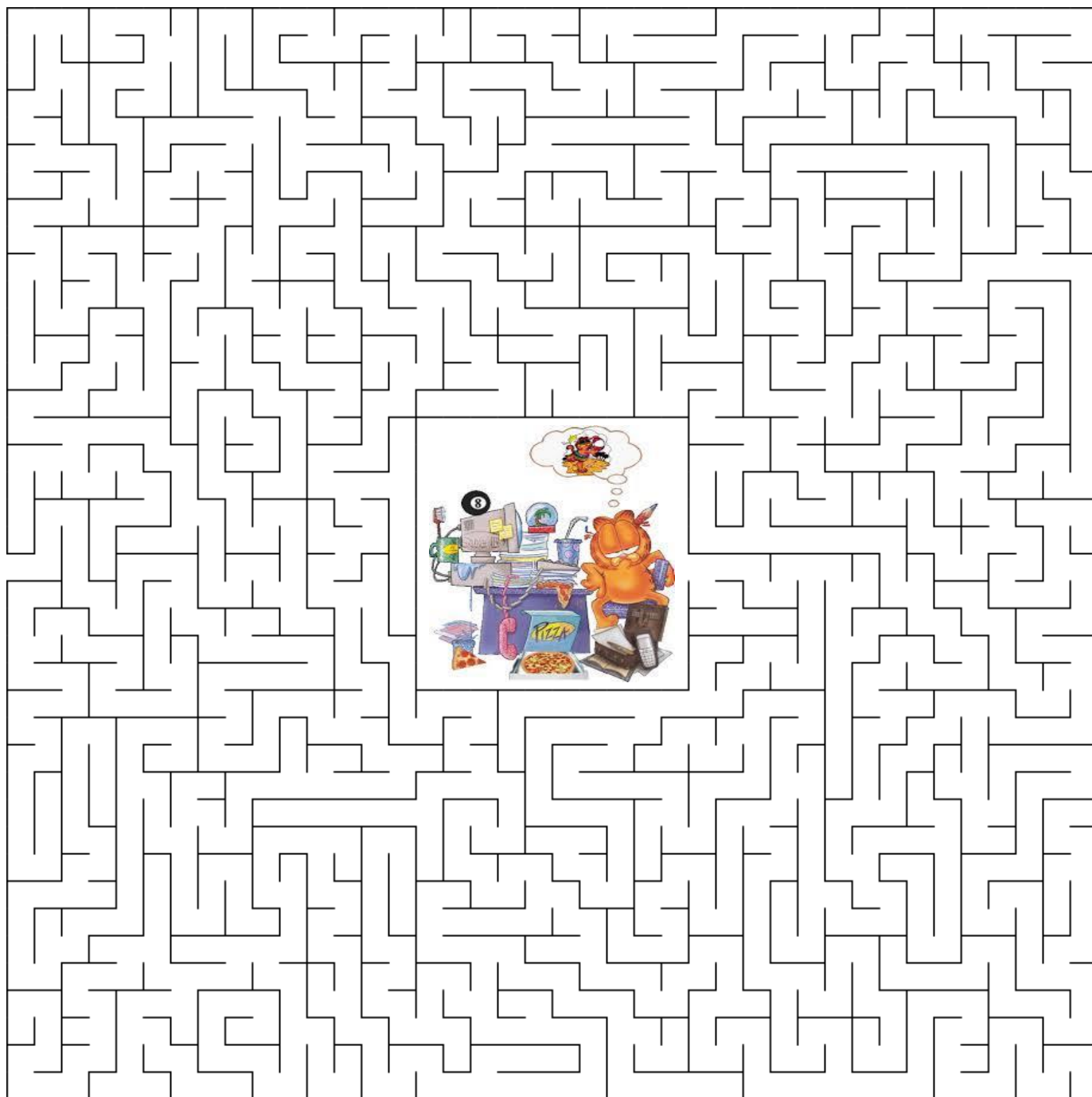
Answers ⁱ

II: Can you place all these metals?

| | | |
|------------------|-----------------|-------------------|
| <i>Aluminium</i> | <i>Arsenic</i> | <i>Beryllium</i> |
| <i>Bismuth</i> | <i>Cadmium</i> | <i>Chromium</i> |
| <i>Cobalt</i> | <i>Copper</i> | <i>Gallium</i> |
| <i>Gold</i> | <i>Iridium</i> | <i>Iron</i> |
| <i>Lead</i> | <i>Lithium</i> | <i>Magnesium</i> |
| <i>Manganese</i> | <i>Mercury</i> | <i>Molybdenum</i> |
| <i>Nickel</i> | <i>Osmium</i> | <i>Palladium</i> |
| <i>Platinum</i> | <i>Rhodium</i> | <i>Silver</i> |
| <i>Thallium</i> | <i>Tin</i> | <i>Titanium</i> |
| <i>Tungsten</i> | <i>Vanadium</i> | <i>Zinc</i> |

Y T C D Z L X C X M T X M X Q H V P M K
 K C B I X W H T U G L D L Q N H A C W U
 Z K N S N R G I P L A T I N U M N J Y Q
 Y C Z L O E S W Z O B V X Y Y V A T Y O
 A B G M C E S J Y E O D O L D Y D J R E
 D D I G N B N R Q B C K C P D S I H H T
 O U F G I T U J A B E R Y L L I U M O W
 M N A B T C I E S E N E G N A M M L D M
 T M L M R A C T R E V L I S R G E G I U
 C B U E O N W E A S W C E P Z K C O U I
 V I M L M L O G D N Q N A A C T H C M M
 R S I H J U Y R P Q I L Z I D L F W U S
 Q M N H C R I B I E L U N E A T J I Y O
 M U I L L A G M D A J X M E D Q D G O R
 Q T U H P C C U D E G T S S T I O Q A F
 K H M E U P S I D A N O V J R S G H V M
 R B X R X M U H V R C U L I L R G Q S F
 U Y S U X M Q T G R A W M D E F K N Y I
 H D T H A L L I U M N R I I A E D I U Y
 I V E W H S C L V Z A C O P P E R C B T

III: Get me out of here.....



i: Metals Knowledge

1/c. – 2/b. – 3/ b. (miners once mistook this Mo ore for Pb) – 4/a. (at 29,76C°) - 5/c. – 6/a. (at 3.422C°) – 7/b. – 8/c. (2 of them women)