

1 July 2015

Background document for lead monoxide

Document developed in the context of ECHA's 6th recommendation for the inclusion of substances in Annex XIV

ECHA is required to regularly prioritise the substances from the Candidate List and to submit to the European Commission recommendations of substances that should be subject to authorisation. This document provides background information on the prioritisation of the substance, as well as on the determination of its draft entry in the Authorisation List (Annex XIV of the REACH Regulation). Information comprising confidential comments submitted during public consultation, or relating to content of Registration dossiers which is of such nature that it may potentially harm the commercial interest of companies if it was disclosed, is provided in a confidential annex to this document.

1. Identity of the substance

Chemical name: Lead monoxide
EC Number: 215-267-0
CAS Number: 1317-36-8
IUPAC Name: Lead monoxide

2. Background information for prioritisation

Priority was assessed by using the General approach for prioritisation of SVHCs for inclusion in the list of substances subject to authorisation¹. Results of the prioritisation of all substances included in the Candidate List by June 2013 or before and not yet included or recommended in Annex XIV of the REACH Regulation is available at http://echa.europa.eu/documents/10162/13640/prioritisation_results_6th_rec_en.pdf.

The prioritisation results of the substances included in the draft 6th recommendation have been updated as necessary after the public consultation. The updated results are available at http://echa.europa.eu/documents/10162/13640/updated_prioritisation_results_6th_axiv_rec_en.pdf

2.1. Intrinsic properties

Lead monoxide was identified as a Substance of Very High Concern (SVHC) according to article 57 (c) as it is classified in Annex VI, part 3, Table 3.1 (the list of harmonised classification and labelling of hazardous substances) of Regulation (EC) No 1272/2008 as Toxic for Reproduction, Category 1A, H360D ("May damage the unborn child"), and was therefore included in the candidate list for authorisation on 19/12/2012, following ECHA's decision ED/169/2012.

¹ Document can be accessed at

http://echa.europa.eu/documents/10162/13640/gen_approach_svhc_prior_in_recommendations_en.pdf

2.2. Volume used in the scope of authorisation

The amount of lead monoxide manufactured and/or imported into the EU is according to registration data above 100,000 t/y (approx. 540,000 t/y according to information submitted in the public consultation (ComRef, 2015)).

Part of the volume is for uses that appear not to be in the scope of authorisation, such as uses as intermediate in the manufacture of PVC stabilisers, certain pigments, explosives, technical ceramics, frits and glass (including lead special glass and lead crystal glass) as well as some uses as laboratory reagent and in chemical analysis. It is recognised that the intermediate/non-intermediate status of some of these uses is a complex issue (e.g. in the manufacture of glass and frits), and it is stressed that this prioritisation exercise is not taking a formal position whether certain uses of the substance are regarded as uses as intermediates in accordance with the definition in Art. 3(15).

The volume in the scope of authorisation is estimated to be in the range of 100,000 - 1,000,000 t/y based on registrations and further information (ComRef, 2015).

2.3. Wide-dispersiveness of uses

Registered uses of lead monoxide which appear to be in the scope of authorisation include uses at industrial sites (e.g. production of batteries and rubber, use in adsorbents and catalysts and as laboratory reagent). In addition, according to the information from the industry the substance is used for surface treatment (plating) and in lubricant/corrosion inhibitor products in the aerospace industry (ComRef, 2015).

It can also be used in graphite containing dispersion pastes, machining, scraping compounds, friction breaks, and sealants (RCOM, 2012). There is no further information on these (non-registered) uses and therefore it is not possible to conclude whether the uses take place at industrial sites or whether some of them could be carried out by professional workers.

According to comments received from industry (ComRef, 2015) the only relevant professional use of lead monoxide is its use as laboratory reagent which is not in high volume and is typically under controlled conditions. Professional uses as laboratory reagent and in chemical analysis are indeed reported in registrations and the information provided indicates that the conditions for the generic exemption from the authorisation requirement for the uses in Scientific Research and Development may not always be met (based on the tonnage for that use). Based on the information provided both in registration and in the public consultation it appears that the use may rather fulfil the description of an industrial use. The use appears to be limited to industrial facilities and does not seem to be widespread. It is acknowledged that the differentiation between IND and PROF is not always straightforward and might – in certain cases – require a weight of evidence assessment.

The lead registrant and most of the member registrants have recently updated their registrations. They have, *inter alia*, removed the professional and consumer use of paints and pigments (e.g. artists' paints²) containing lead monoxide from their registrations. Furthermore, the International Lead Association has informed that the use in artists' paints is an obsolete use and the lead registrant has asked the member registrants to update their dossiers. There are some members who have not yet updated their registrations, and the professional and consumer uses in paints (and professional use of adsorbents) remain in their dossiers. Other members have updated their dossiers and kept these uses. However, these members refer to

² This use is derogated from the restriction to supply CMR substances on their own or in mixtures to the general public.

the lead registrant's CSR which no longer supports these uses.

Finally, according to registrations the substance is used in articles and information provided by industry (RCOM, 2012; ComRef, 2015) indicates that this is in volumes above 10 t/y (e.g. rubber articles).

Further information on uses is provided in Section 3.

2.4. Further considerations for priority setting

It appears that lead monoxide is used in some similar applications (batteries) with orange lead (lead tetroxide), pentalead tetraoxide sulphate and tetralead trioxide sulphate. However, it has not been assessed whether the function of these substances in these applications is the same and whether or under which conditions substitution could happen in practice.

2.5. Conclusions and justification

Verbal descriptions and Scores			Total Score (= IP + V + WDU)	Further considerations
Inherent properties (IP)	Volume (V)	Wide dispersiveness of uses (WDU)		
Lead monoxide is classified as toxic for reproduction 1A meeting the criteria 57c Score: 1	The amount of lead monoxide used in the scope of authorisation is > 10,000 t/y Score: 15	Lead monoxide is used at industrial sites. Initial score: 5 Furthermore, the substance is used in articles in volumes > 10 t/y (e.g. rubber articles) and uncertainties exists on potential uses of the substance by professional workers ³ . Refined score: 7	23	Grouping of lead monoxide with other lead substances used in batteries

Conclusion

Lead monoxide is considered for prioritisation based on grouping consideration with orange lead (lead tetroxide) and other lead substances used in batteries (pentalead tetraoxide sulphate and tetralead trioxide sulphate).

On the basis of prioritisation criteria orange lead (lead tetroxide) receives high priority among the substances in the Candidate List (see link to the prioritisation results above).

However, other substances included in the draft 6th recommendation have higher priority based on Art. 58(3) prioritisation criteria and/or based on grouping considerations. In accordance with Art. 58(3) the number of substances included in a recommendation need to take into account ECHA's capacity to handle applications for authorisation in the time provided for. Therefore, the recommendation of orange lead (lead tetroxide) and other lead substances used in batteries is postponed. Consequently, lead monoxide is not included in ECHA's final 6th

³ There is still uncertainty on whether the substance might still be used by consumers (see section 2.3 for more information). However that uncertainty does not seem to justify a higher score than resulting for the other refinements

recommendation for inclusion of substances in Annex XIV. The substance will be reassessed for priority in future recommendation rounds.

3. Further information on uses

In addition to the registration information, further details on uses can be found in comments provided during the public consultation on the draft 6th A. XIV recommendation (ComRef, 2015) and the SVHC proposal (RCOM, 2012).

Lead monoxide has several uses in a range of EU industries. The production of automotive and industrial lead acid batteries represents the main use of lead monoxide since it represents ~94% of its total use based on information from industry (ComRef, 2015). The (intermediate) use of lead monoxide in manufacture of lead based PVC stabilisers comprises most of the rest of the relative share (~5%) (though the use of these stabilisers is being phased out due to an industry voluntary commitment – ComRef, 2015). All the other uses represent ~1% of the total volume (ComRef, 2015). However, as the total EU tonnage is high (> 100,000 t/y), the tonnage corresponding to some of the uses representing low relative share may still be in the range of tens, hundreds or even thousands of tons per year.

The estimated volumes for uses of lead monoxide in the scope of authorisation (based on the information from industry during the public consultation on the 6th draft recommendation (ComRef, 2015)) are given below:

- in the production of battery plates used in the production of automotive and industrial batteries: <510,000 t/y;
- as in the rubber production: from <200 to ~600 t/y⁴
- in adsorbents: <50 t/y

In addition, during the SVHC public consultation, industry stated that < 500 t/y of lead monoxide can be used in graphite containing dispersion pastes, machining, scraping compounds and friction brakes (RCOM, 2012). An industrial use in sealants was also identified. During the public consultation on the draft 6th Recommendation (ComRef, 2015) industry stated that minor volumes can be used in surface treatment (plating), in products that provide lubrication and corrosion protection on critical aerospace products, and in catalysts.

Further information on some of the above listed uses is given below.

Use in the production of batteries

In lead acid battery production, lead monoxide is used in the production of battery pastes and it is transformed in the course of the battery production process into pentalead tetraoxide sulphate and tetralead trioxide sulphate, and then ultimately into lead metal (Pb) and lead dioxide (PbO₂). The latter two substances are the lead-based active substances present in the battery. Chemical reactions for lead monoxide occur throughout the battery production process. At the final stage of the process when the battery is charged the substance has fully reacted and in most lead based batteries only some residual concentrations remain in the final article (further details on battery production available in ILA and EUROBAT comments - RCOM, 2012).

Lead-based batteries are widely used in automotive vehicles and industrial motive and standby applications, e.g. in forklift trucks and electric wheelchairs, as Uninterruptible Power Supply (UPS) for hospitals, IT applications and telecommunication systems including both landline and mobile telephone base station applications (RCOM, 2012). It is reported that approximately one third of the tonnage of lead monoxide used in batteries is used in industrial batteries and

⁴ Divergent data given.

the remaining two thirds in automotive batteries (RCOM, 2012). Key countries for lead-based battery manufacture in Europe include France, Germany, Italy, Spain, Poland, the Czech Republic, Portugal and the UK.

Use in the production of rubber

Several uses of lead monoxide in the rubber industry have been reported which include: use as antioxidant especially for use in contact with acids and/or steam (e.g. in rubber rollers, valves and accessories); use as vulcanizing agent (in hoses); use as adhesion promoter and corrosion inhibitor (e.g. in steel cable conveyor belts); use to reduce water absorption in membranes (RCOM, 2012).

Lead monoxide is also used in specific applications such as cable insulation and sheathing where specifications for electrical performance in wet conditions need to be fulfilled.

The rubber products described above, in which lead monoxide is used, are used by a number of sectors including: the chemical industry; gas pipe installations; mining industry; automotive industry; cement industry; power plants; ports and inflatable structures manufacturers. Industry indicates that lead monoxide is used in the manufacture of rubber compounds at sites located e.g. in Germany, the Czech Republic, Slovakia and Greece (RCOM, 2012).

Other uses

The use of lead monoxide in adsorbent is reported in registrations. One company commenting during the public consultation on the draft 6th recommendation reported use of very low quantity (<50t/y) in the removal of arsine and sulfur compounds from hydrocarbon streams (e.g. cracked gases) (ComRef, 2015). The International Lead Association commenting on this use confirmed the low tonnage (ComRef, 2015).

The comments received on the use in catalysts relate to the special use of lead acetate where lead monoxide could be formed in the catalyst (e.g. Lindlar catalyst) (ComRef, 2015).

Lead monoxide is part of formulations used in aerospace and defence industry to provide lubrication and corrosion protection on critical aerospace products where the technical requirements are significantly demanding. Dry film lubricants utilise lead monoxide due to its thermal stability and low coefficient of friction in temperatures up to 650°C. Specialty uses include rings, seals and bearing races (ComRef, 2015).

Use of lead monoxide for surface treatment (plating) is reported in comments received during the public consultation on the draft 6th recommendation (ComRef, 2015) for localized and selective applications (e.g. in the manufacture of bearings for equipment such as larger engines and compressors). The treatment can be required at production stage or at maintenance stage for repair purposes. The Printing, Oil & Gas, Marine, Aerospace and Automotive industries are reported to rely on this surface treatment activity (ComRef, 2015).

4. Background information for the proposed Annex XIV entry

Draft Annex XIV entries were determined on the basis of the General approach for preparation of draft Annex XIV entries for substances to be included in Annex XIV⁵. The draft Annex XIV entries for substances included in this draft recommendation are available at http://echa.europa.eu/documents/10162/13640/6th_axiv_recommendation_july2015_en.pdf

[This section is not relevant as the substance is not included in the final 6th recommendation.]

⁵ Document can be accessed at

http://echa.europa.eu/documents/10162/13640/draft_axiv_entries_gen_approach_6th_en.pdf

5. References

RCOM (2012): "*Responses to comments*" document. Document compiled by ECHA from the commenting period 03/09/2012-18/10/2012 on the proposal to identify lead monoxide as a Substance of Very High Concern.

<http://echa.europa.eu/candidate-list-table/-/substance/2427/search/215-267-0/term>

ComRef (2015): "*Comments and references to responses*" document. Document compiling comments and references to respective answers from commenting period 01/09/2014 – 01/12/2014 on ECHA's proposal to include lead monoxide in its 6th recommendation of priority substances for inclusion in the list of substances subject to authorisation (Annex XIV).

http://echa.europa.eu/documents/10162/13640/6th_axiv_rec_comref_lead_monoxide_en.pdf