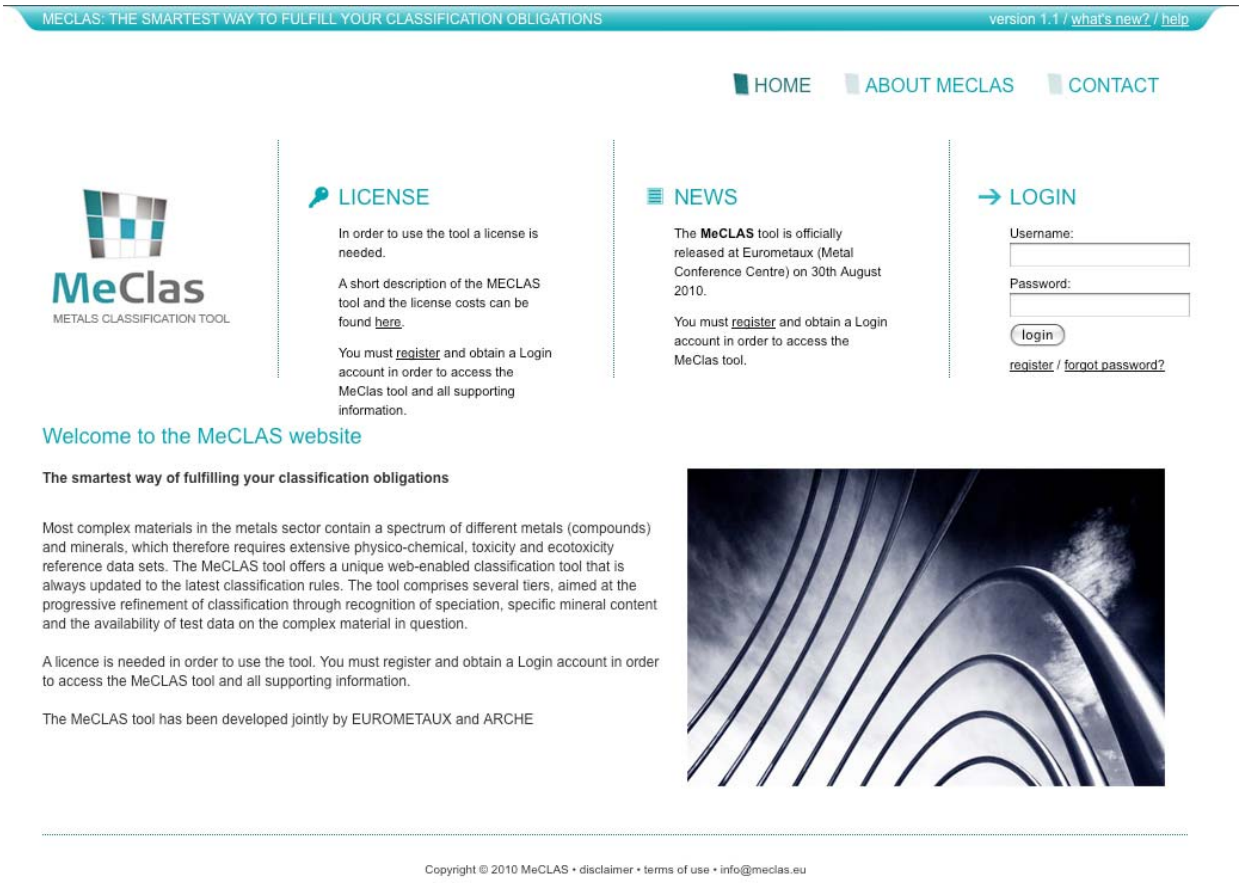
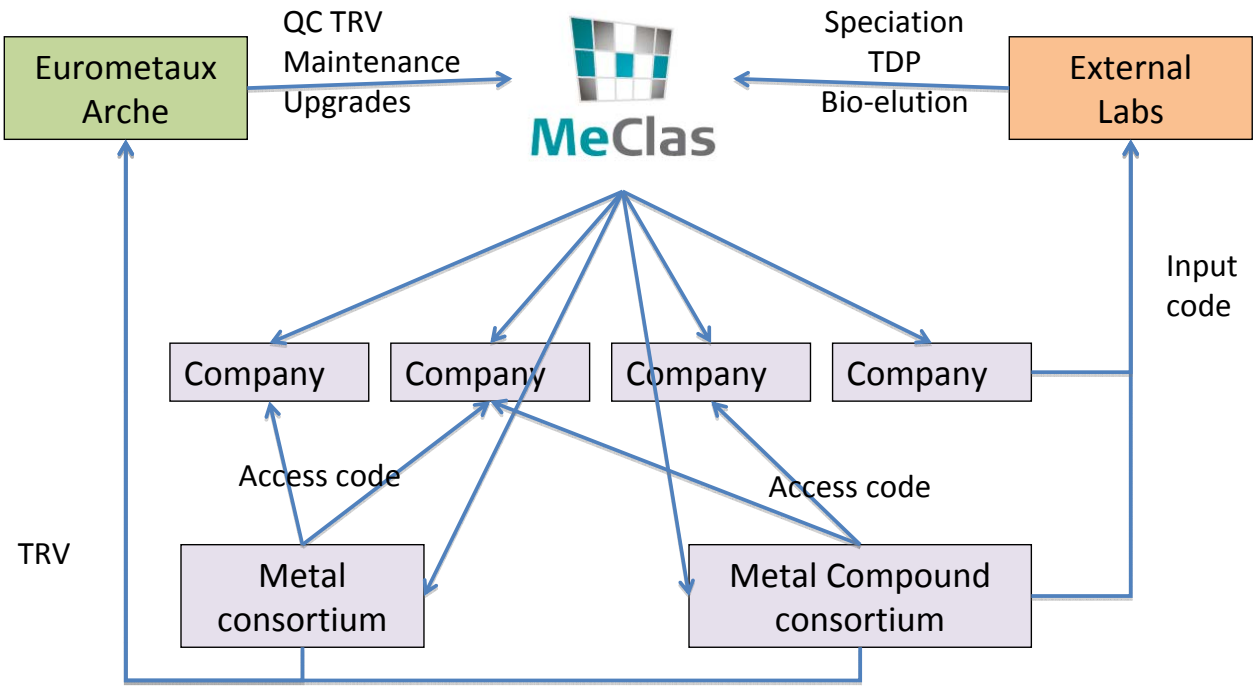
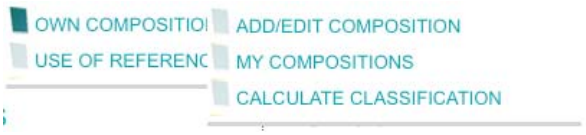
# www.meclas.eu



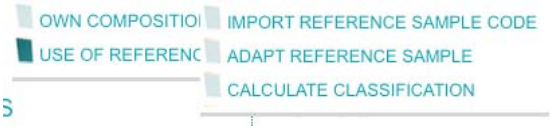



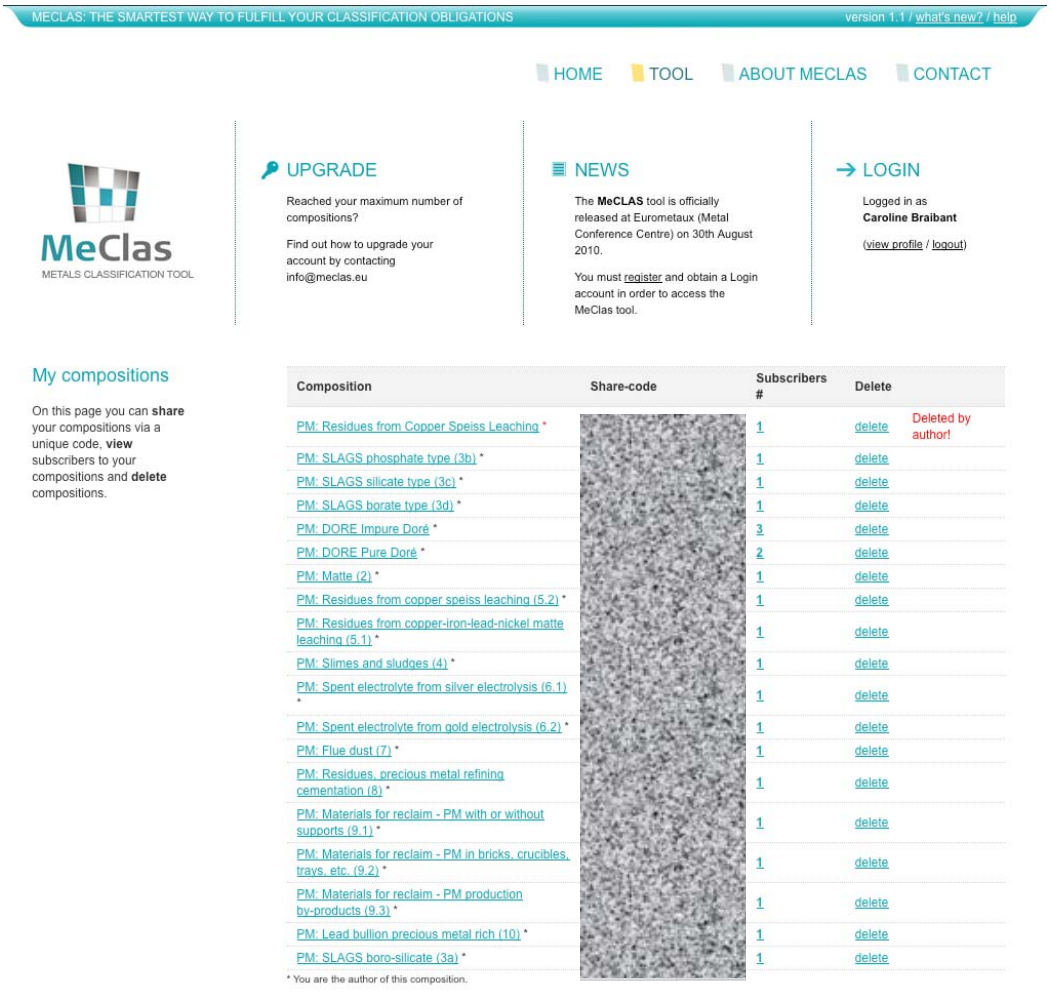
# Tool functionalities

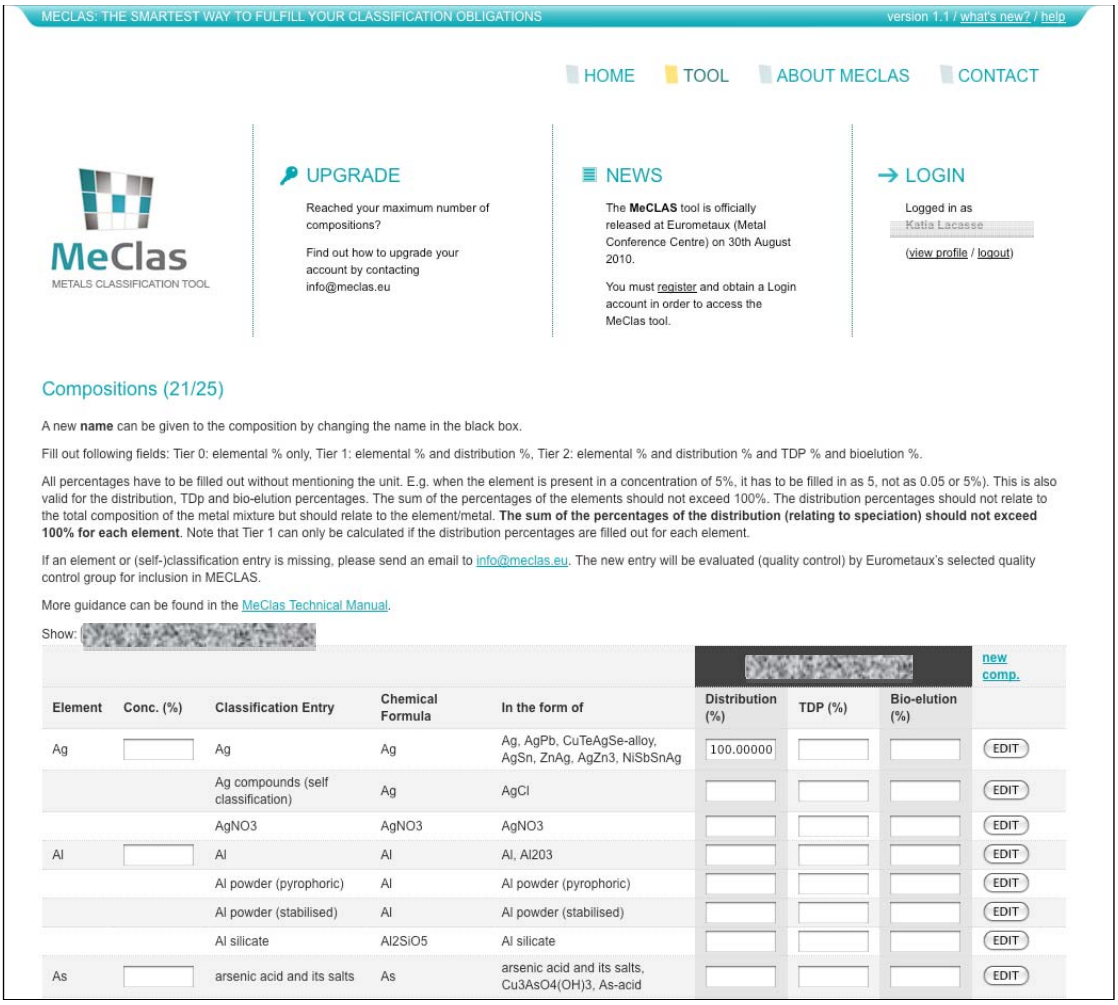
- **Own compositions**
  - Add/Edit composition
  - My compositions
  - Calculate classification



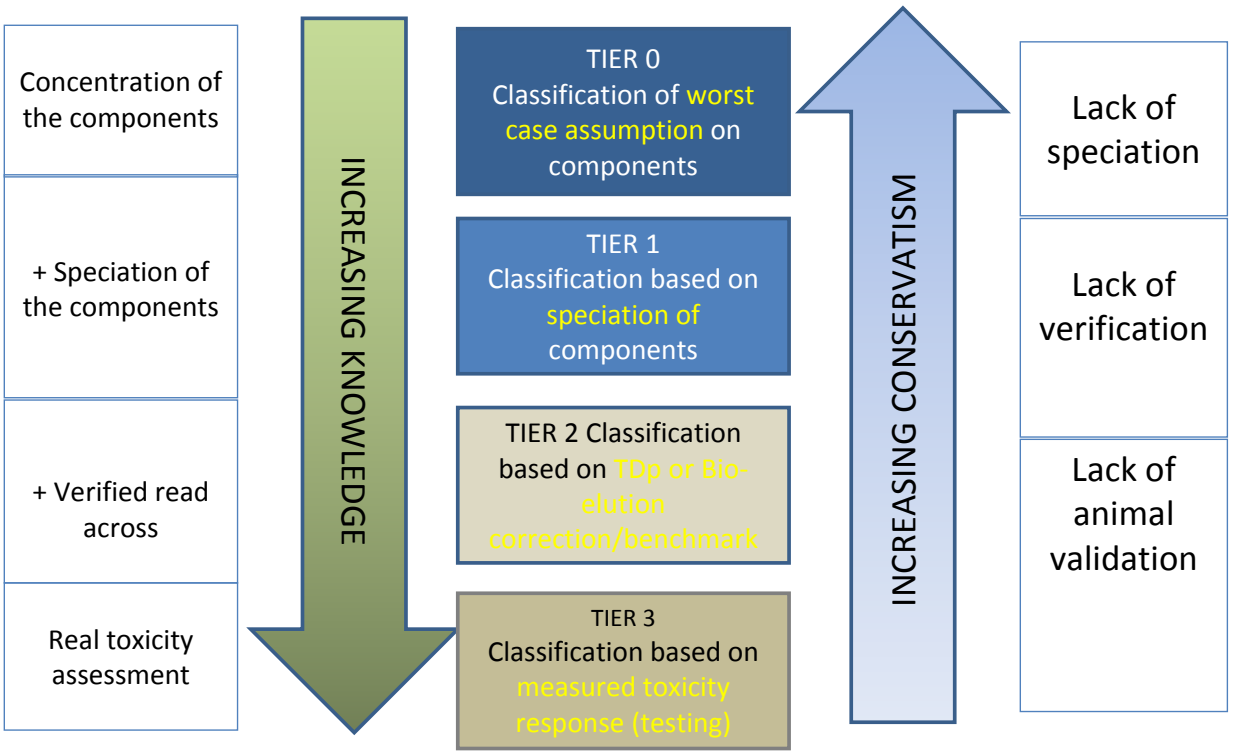

- **Use of reference sample**
  - Import reference sample code
  - Adapt reference sample
  - Calculate classification






# SCHEMATIC OVERVIEW of the TIERED CLASSIFICATION APPROACH FOR COMPLEX MATERIALS



## Tier 0

## Tier 1

## Tier 2

| Element | Conc. (%) | Classification Entry | Chemical Formula | In the form of | Species Distribution (%) | TDP (%) | Bio-elution (%) |
|---|---|---|---|---|---|---|---|
| Ni | 0.90000 | Ni | Ni | CuNi, CuNiSbAsSn, CuSnSbNi, FeCrNi, FeNiSi, FeNiSn, Ni, Ni2As, NiAs, NiAsSnSb, NiCOFeAs, NiFeSi, NiMg silicate, NiSb, NiSbSn, NiSbSnAg, NiSi, NiSiAl, NiSn, SbNiAs, SbNiCoCA-alloy, SbSNNiCuFe, SnCuNiFe, SnNiSb-alloy | 100.00000 | 0.30000 | |
| | | Ni powder | Ni | CuNi, CuNiSbAsSn, CuSnSbNi, FeCrNi, FeNiSi, FeNiSn, Ni powder, Ni2As, NiAs, NiAsSnSb, NiCOFeAs, SnCuFeNi, NiFeSi, NiMg silicate, NiSb, NiSbSn, NiSbSnAg, NiSi, NiSiAl, NiSn, SbNiAs, SbNiCoCA-alloy, SbSNNiCuFe, SnCuNiFe, SnNiSb-alloy | | | |
| | | Ni2O3 | Ni2O3 | Ni2O3 | | | |
| | | Ni3S2 | Ni3S2 | Ni3S2 | | | |
| | | NiO | NiO | NiO, CuNiSbOx, FeNiO2, NiFe2O4, NiAs, NiFeSb oxide, CaMgNiSiO, FeZnNi-oxide | | | |
| | | NiO2 | NiO2 | NiO2 | | | |
| | | NiS | NiS | NiS, Pb2Ni3S2, Ni3S4 | | | |
| | | NiSO4 | NiSO4 | NiSO4, CoNiSbSO4 | | | |

## **Elemental** Analysis

| | | | |
|---|---|---|---|
| Cu | TOT | % | 0,60 |
| As | TOT | % | 0,00 |
| Fe | TOT | % | 12,20 |
| Ni | TOT | % | 0,03 |
| Pb | TOT | % | 0,28 |
| Co | TOT | % | 0,21 |
| | BM | % | |
| Sb | TOT | % | <0.01 |
| Sn | TOT | % | <0.01 |
| Zn | TOT | % | 0,86 |
| Mo | TOT | % | |
| Ag | TOT | % | <0.002 |
| Se | TOT | % | |
| Sr | TOT | % | |
| Te | TOT | % | |
| Bi | TOT | % | |
| Cd | TOT | % | |
| SiO2 | KEM | % | 45,30 |
| Al2O3 | TOT | % | 13,20 |
| Cr2O3 | TOT | % | 0,19 |
| K2O | TOT | % | 3,70 |
| MgO | TOT | % | 6,80 |
| MnO | TOT | % | 0,30 |
| Na2O | TOT | % | 1,10 |
| CaO | TOT | % | 11,00 |

## **Speciation** Analysis

% relative to total mixture

| | | |
|---|---|---|
| CuFeS | Chalcopyrite | 0,44 |
| FeCr2O4 | Chromite | 0,63 |
| CoFeS | Villamaninite | 0,08 |
| Cu | Copper | 0,26 |
| Fe2SiO4 | Fayalite | 16,40 |
| FeCo | Fe -alloy | 0,67 |
| KAlSiOx | K- Al -silicate | 32,11 |
| Si(Fe,Al,Ca)O2-3 | Glass | 9,65 |
| Pb | Lead | 0,11 |
| PbO | Litharge | 0,09 |
| PbS | Galena | 0,09 |
| CaSiOx | Ca -silicate | 37,61 |
| ZnFeS | Sphalerite | 1,33 |
| Fe3O4 | Magnetite | 0,54 |

% relative to metal

| Distribution of iron | |
|---|---|
| CuFeS | 0,42 |
| FeCr2O4 | 1,03 |
| CoFeS | 0,19 |
| Cu | 0,04 |
| Fe2SiO4 | 37,89 |
| FeCo | 4,91 |
| KAlSiOx | 2,09 |
| Si(Fe,Al,Ca)O2-3 | 11,87 |
| CaSiOx | 32,78 |
| ZnFeS | 4,22 |
| Fe3O4 | 4,54 |

| Distribution of zinc | |
|---|---|
| FeCr2O4 | 2,56 |
| ZnFeS | 53,93 |
| Fe2SiO4 | 17,88 |
| KAlSiOx | 2,26 |
| CaSiOx | 14,30 |
| Si(Fe,Al,Ca)O2-3 | 9,07 |

| Distribution of lead | |
|---|---|
| Pb | 42,78 |
| PbO | 31,85 |
| PbS | 25,37 |

| Distribution of copper | |
|---|---|
| CuFeS | 49,61 |
| FeCr2O4 | 0,09 |
| Cu | 42,17 |
| FeCo | 6,35 |
| KAlSiOx | 0,94 |
| Si(Fe,Al,Ca)O2-3 | 0,84 |

If representative sample, can be used as translator for other samples

## Calculate classification

Metal mixture:

Version:

Output:

- Tier 0
- Tier 1
- Tier 2

## Output Tier 0

**CLP**

| Endpoint | Classification | Major driver |
|---|---|---|
| Acute toxicity-oral | Cat. 3; H301 | / |
| Acute toxicity-dermal | Not classified | / |
| Acute toxicity-inhalation | Not classified | / |
| Skin corrosion/irritation | Cat. 2; H315 | As2O3 / AsO3 |
| Serious eye damage/eye irritation | Cat. 1; H318 | CuSO4,CuSO4 |
| Respiratory or skin sensitisation | Resp./Skin Sens. Cat.1; H334/H317 | NiSO4 |
| Germ cell mutagenicity | Cat. 2; H341 | NiSO4 |
| Carcinogenicity | Cat. 1A; H350 | As2O3 / AsO3 |
| Reproductive toxicity | Cat. 1A; H360 | lead compounds with the exception of those specified elsewhere in this Annex |
| Specific target organ toxicity - single exposure | Not classified | / |
| Specific target organ toxicity - repeated exposure | Cat. 1; H372 | NiSO4 |
| Aspiration hazard | Not classified | / |
| Hazardous to aquatic environment | Chronic Cat. 1; H410 | As2O3 / AsO3,NiSO4,lead compounds with the exception of those specified elsewhere in this Annex,CuSO4 |

**Directive1999/45/EC**


| Endpoint | Classification | Major driver |
|---|---|---|
| Acute toxicity | Xn; R20/22 | One or more |
| Corrosion | Not classified | / |
| Irritation | Xi; R41 | One or more |
| Respiratory or skin sensitisation | R42/43 | NiSO4 |
| Germ cell mutagenicity | Muta. Cat. 3; R68 | NiSO4 |
| Carcinogenicity | Carc. Cat. 1; R49 | As2O3 / AsO3 |
| Reproductive toxicity | Repr. Cat. 1; R60/61 | lead compounds with the exception of those specified elsewhere in this Annex |
| Hazardous to aquatic environment | N; R50-53 | As2O3 / AsO3,NiSO4,lead compounds with the exception of those specified elsewhere in this Annex,CuSO4 |

## Calculate classification

Metal mixture:

Version:

Output:

- Tier 0
- Tier 1
- Tier 2

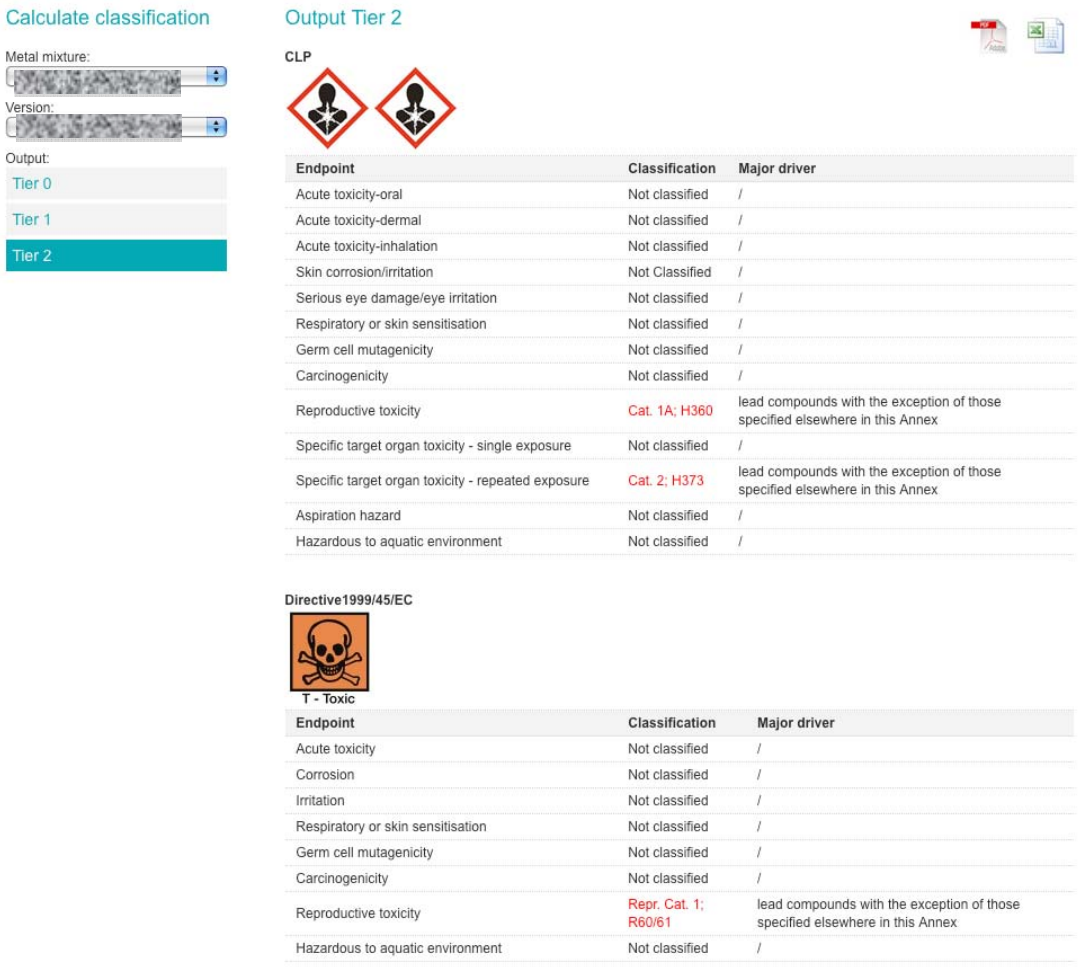
## Output Tier 1

**CLP**

| Endpoint | Classification | Major driver |
|---|---|---|
| Acute toxicity-oral | Not classified | / |
| Acute toxicity-dermal | Not classified | / |
| Acute toxicity-inhalation | Not classified | / |
| Skin corrosion/irritation | Not Classified | / |
| Serious eye damage/eye irritation | Not classified | / |
| Respiratory or skin sensitisation | Not classified | / |
| Germ cell mutagenicity | Not classified | / |
| Carcinogenicity | Not classified | / |
| Reproductive toxicity | Cat. 1A; H360 | lead compounds with the exception of those specified elsewhere in this Annex |
| Specific target organ toxicity - single exposure | Not classified | / |
| Specific target organ toxicity - repeated exposure | Cat. 2; H373 | lead compounds with the exception of those specified elsewhere in this Annex |
| Aspiration hazard | Not classified | / |
| Hazardous to aquatic environment | Chronic Cat. 1; H410 | Arsenic compounds, with the exception of those specified elsewhere in this Annex,lead compounds with the exception of those specified elsewhere in this Annex,Copper (I) oxide |

**Directive1999/45/EC**

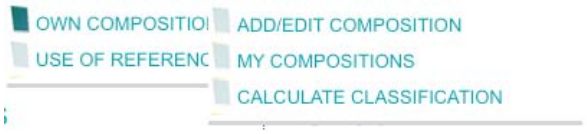

| Endpoint | Classification | Major driver |
|---|---|---|
| Acute toxicity | Not classified | / |
| Corrosion | Not classified | / |
| Irritation | Not classified | / |
| Respiratory or skin sensitisation | Not classified | / |
| Germ cell mutagenicity | Not classified | / |
| Carcinogenicity | Not classified | / |
| Reproductive toxicity | Repr. Cat. 1; R60/61 | lead compounds with the exception of those specified elsewhere in this Annex |
| Hazardous to aquatic environment | N; R50-53 | Copper (I) oxide |



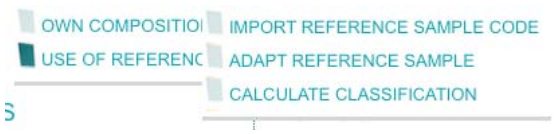

MeClas
METALS CLASSIFICATION TOOL

# Tool functionalities

- **Own compositions**
  - Add/Edit composition
  - My compositions
  - Calculate classification




- **Use of reference sample**
  - Import reference sample code
  - Adapt reference sample
  - Calculate classification



save changes | clear all | show all | show selected entries

| Element | Concentration% (user input) | Concentration% (ref sample) | In the form of | Species Distribution (user input) | Distribution (ref sample) | Species / Classification entry | Formulae | TDP | Bio-elution |
|---|---|---|---|---|---|---|---|---|---|
| Ag | | 0.10000 | Ag, AgPb, CuTeAgSe-alloy, AgSn, ZnAg, AgZn3, NiSbSnAg | | 100.00000 | Ag | Ag | | |
| | | | AgCl | | | Ag compounds (self classification) | Ag | | |
| | | | AgNO3 | | | AgNO3 | AgNO3 | | |
| Al | | | Al, Al203 | | 100.00000 | Al | Al | | |
| As | | 0.10000 | arsenic acid and its salts, Cu3AsO4(OH)3, As-acid | | | arsenic acid and its salts | As | | |
| | | | Arsenic compounds with the exception o those specified elsewhere in this Annex, PbAsOx, SbAsOx, PbAsO, SbAsO, CuAsOx, Cu3AsS4, PbCaAsx NiAS, PbSbAs oxide | | | Arsenic compounds, with the exception of those specified elsewhere in this Annex | As | | |
| | | | As, AgAs, AgSb, Cu3As, NiCoFeAs, FeAs, Cu5As2, Ni2As, SbSnAs-alloy CuAs, NiAs, SbNiAs | | 100.00000 | As | As | | |
| | | | As2O3 / AsO3, SbAs-oxide, PbAs oxide | | | As2O3 / AsO3 | As2O3 | | |
| | | | As2O5 / AsO5 / AsO PbSbAsO | | | As2O5 / AsO5 / AsO | As2O5 | | |
| | | | Au2S3, Sulfide form | | 100.00000 | Au2S3 | Au2S3 | | |
| Co | | 1.00000 | Co, FeCo, NiCoFeA | | 31.73000 | Co | Co | | |
| | | | CoO, oxide form | | | CoO | CoO | | |
| | | | CoS, CoFeS2 | | 68.27000 | CoS | CoS | | |
| | | | CoSo4, CoNiSbSO4 sulphate form | | | CoSO4 | CoSO4 | | |
| Cu | | 55.00000 | Copper (I) oxide, Cu2O, CuFeO2, CuNiSbOx, CuAsOx (Cu,Cr)O2-3, Cu3AsO4(OH)3, NaCuSiO, TeCuPb-oxide | | | Copper (I) oxide | Cu2O | | |

**ELEMENTAL ANALYSIS**

| Element | Molecular weight | Concentration % | Concentration % | Concentration % | Concentration % | Concentration % | Concentration % | Concentration % | Concentration % | Concentration % | Concentration % | Concentration % | Concentration % | Concentration % | Concentration % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ag | 107,868 | 87,00 | 35,00 | 80,00 | 44,89 | 86,00 | 52,00 | 55,00 | 99,18 | 40,00 | 15,00 | 94,85 | 94,85 | 94,85 | 94,85 |
| Al | 26,982 | | | | | | | | 0,04 | | | | | | |
| As | 74,922 | | | | | | | 0,50 | | | | | | | |
| | | | | | | | | | | | | | | | |
| Au | 196,967 | 6,55 | | | 1,97 | 9,50 | 2,00 | 1,65 | 0,30 | 1,75 | 2,53 | 2,75 | 2,75 | 2,75 | 2,75 |
| B | 10,811 | | | | | | | | | | | | | | |
| Ba | 137,327 | | | | | | | | | | | | | | |
| Bi | 208,98 | 0,04 | #DIV/0! | | 0,01 | | | 3,05 | 0,01 | | | | | 0,10 | |
| Br | 79,904 | | | | | | | | | | | | | | |
| C | 12,011 | | | | | | | | | | | | | | |
| Ca | 40,078 | | | | | | | | | | | | | | |
| Cd | 112,41 | | | | | | | | | | | | | | |
| Ce | 140,116 | | | | | | | | | | | | | | |
| Cl | 35,453 | | | | | | | | | | | | | | |
| Cr | 51,996 | | | | | | | | | | | | | | |
| Cs | 132,905 | | | | | | | | | | | | | | |
| Cu | 63,546 | 4,30 | 4,15 | | 1,50 | 1,00 | | 20,00 | 0,55 | 45,00 | 62,50 | 0,25 | 0,25 | 0,25 | 0,25 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| F | 18,998 | | | | | | | | | | | | | | |
| Fe | 55,845 | | | | | | | 25,05 | | | | | | | |
| H2O | 33,008 | | | | | | | | | | | | | | |
| Ir | 192,217 | | | | | | | 1,01 | | | | | | | |
| K | 39,098 | | | | | | | | | | | | | | |
| KCl | 74,551 | | | | | | | | | | | | | | |
| Li | 6,941 | | | | | | | | | | | | | | |
| Mg | 24,305 | | | | | | | 2,50 | | | | | | | |
| Mn | 54,938 | | | | | | | | | | | | | | |
| Mo | 95,94 | | | | | | | | | | | | | | |
| Na | 22,99 | | | | | | | | | | | | | | |
| Nb | 92,906 | | | | | | | | | | | | | | |
| NH3 | 17,031 | | | | | | | | | | | | | | |
| Ni | 58,693 | | | | | | 0,07 | 7,75 | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| O | 16 | | | | | | | | | | | | | | |
| Os | 190,23 | | | | | | | | | | | | | | |
| Pb | 207,2 | 0,09 | 5,00 | | 0,01 | | 2,25 | 2,75 | 0,02 | | | 0,10 | 0,10 | 0,10 | 0,10 |
| Pd | 106,42 | 0,84 | | | 0,25 | 0,60 | | 2,55 | | 0,30 | 0,30 | 1,55 | 1,55 | 1,55 | 1,55 |
| Pt | 195,078 | 0,40 | | | 0,07 | 0,40 | | 2,60 | | 0,30 | 0,30 | 1,35 | 1,35 | 1,35 | 1,35 |
| Rb | 85,468 | | | | | | | | | | | | | | |
| Rh | 102,906 | 0,05 | | | 0,01 | | | 1,00 | | | | 0,05 | 0,05 | 0,05 | 0,05 |
| Ru | 101,07 | | | | 0,00 | | | 2,55 | | | | | | | |
| S | 32,065 | | | | | | | | | | | | | | |
| Sb | 121,76 | 0,03 | | | 0,01 | | | 1,05 | 0,03 | | | | | | |
| Se | 78,96 | 2,50 | | | 0,26 | | 1,27 | 0,55 | 0,01 | | | | | | |
| SiO2 | 60,084 | | | | | | | | | | | | | | |
| Sn | 118,71 | | | | | | | 1,05 | | | | | | | |
| Sr | 87,62 | | | | | | | | | | | | | | |
| Te | 127,6 | 1,77 | | | 0,85 | | 5,00 | 1,05 | 0,02 | | | | | | |
| Ti | 47,867 | | | | | | | | | | | | | | |
| V | 50,942 | | | | | | | | | | | | | | |
| W | 183,84 | | | | | | | | | | | | | | |
| Zn | 65,38 | | 5,00 | | | | | 1,55 | | | | | | | |
| Zr | 91,224 | | | | | | | | | | | | | | |
| Co | 58,933 | | | | | | | | | | | | | | |
| N | 63,005 | | | | | | | | | | | | | | |
| | TOTAL | 103,56 | 49,15 | 80,00 | 49,79 | 97,50 | 62,59 | 133,21 | 100,13 | 87,35 | 80,63 | 100,90 | 100,90 | 101,00 | 100,90 |

CLP

| Endpoint | Classifica | Classifica | Classifica | Classifica | Classifica | Classifica | Classifica | Classifica | Classifica | Classifica | Classifica | Classifica | Classifica | Classificat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acute toxicity-oral | Not classified | Not classified | Not classified | Not classified | Not classified | **Cat. 4; H302** | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified |
| Acute toxicity-dermal | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified |
| Acute toxicity-inhalation | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | **Cat. 4; H332** | Not classified | Not classified | Not classified | Not classified |
| Skin corrosion/irritation | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified |
| Serious eye damage/eye irritation | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | **Cat. 2; H319** | **Cat. 2; H319** | Not classified | Not classified | Not classified | Not classified |
| Respiratory or skin sensitisation | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | **Skin Sens. Cat. 1; H317** | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified |
| Germ cell mutagenicity | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified |
| Carcinogenicity | Not classified | **Cat. 2; H351** | Not classified | Not classified | Not classified | **Cat. 2; H351** | **Cat. 2; H351** | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified |
| Reproductive toxicity | Not classified | **Cat. 1A; H360** | Not classified | Not classified | Not classified | **Cat. 1A; H360** | **Cat. 1A; H360** | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified |
| Specific target organ toxicity - single exposure | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified |
| Specific target organ toxicity - repeated exposure | Not classified | **Cat. 2; H373** | Not classified | Not classified | Not classified | **Cat. 2; H373** | **Cat. 2; H373** | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified |
| Aspiration hazard | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified | Not classified |
| Hazardous to aquatic environment | Not classified | #VALUE! | **Chronic Cat. 1; H410** | **Chronic Cat. 1; H410** | **Chronic Cat. 1; H410** | **Chronic Cat. 1; H410** | **Chronic Cat. 1; H410** | **Chronic Cat. 1; H410** | **Chronic Cat. 1; H410** | **Chronic Cat. 1; H410** | **Chronic Cat. 1; H410** | **Chronic Cat. 1; H410** | **Chronic Cat. 1; H410** | **Chronic Cat. 1; H410** |