

Substance Identity Profile (SIP) for Ashes (residues), coal for Substance Sameness checking

Ashes (residues), coal

Reference in RIP 3.10 from REACH Reg.	UVCB ¹ subtype 2 / 4, where the source is chemical or mineral and the process is a synthesis / refinement.
Name	Ashes from coal fired power stations with and without co-combustion from secondary fuels.
Other names	Fly Ash (FA)/Pulverized Fuel Ash (PFA) including Cenospheres, Bottom Ash (BA), Boiler Slag (BS),
EC number	-
EC name	Ashes (residues), coal
EC description	<p>Ashes from coal fired power stations with and without co-combustion from secondary fuels. Starting materials are hard coal and/or lignite with and without co-combustion of secondary fuels. The thermal conversion takes place at least at a temperature from 1,100 up to 1,700 °C in dry and wet bottom boilers.</p> <p>Beside glass/amorphous material the following main minerals may be present: mullite, quartz, magnetite, anhydrite, anorthite.</p> <p>The following elements may be present (expressed as oxides): aluminium, calcium, iron, magnesium, phosphorus, potassium, silicon, sodium, titanium and sulphur.</p>
CAS number	-
Related CAS numbers	68131-74-8 (ashes(residues)), 68476-96-0 (slags, coal), 93924-19-7 (ashes (residues) cenospheres)
Origin	<p>Starting Materials</p> <ul style="list-style-type: none"> • Coals: <ul style="list-style-type: none"> - hard coal - lignite <p>Coal is a result of a natural process of plant growth and decay, accumulation of debris both vegetal and mineral, with some sorting and stratification, and accomplished by chemical, biological, bacteriological and metamorphic action over millions of years. The organic chemical materials produce heat when burned; the mineral matter remains as the residue called ash.</p> • Secondary fuels: <ul style="list-style-type: none"> - Solid Bio Fuels including husbandry residues - Animal meal (meat and bone meal) - Municipal sewage sludge - Paper sludge - Petroleum coke - Virtually ash free liquid and gaseous fuels <p>The co-combustion is restricted to secondary fuel fractions with pollutant concentrations similar to coal. The maximum percentage of secondary fuels is given by prEN 450 and European Technical Approvals (ETAs).</p>

¹ Substances of **U**nknown or **V**ariable composition, **C**omplex reaction products or **B**iological materials

Process	<p>The fuels are pulverized in mills to a special fineness. After milling the pulverized fuel is send to the furnace where the thermal conversion from the fuel occurs and the heat is set free in the furnace of a steam generator with the aim to the production of electricity and/or heat.</p> <p>The thermal conversion takes place at least at a temperature from 1100 up to 1700°C in dry and wet bottom boilers.</p> <p>Ashes (fly ash incl. cenospheres, bottom ash, boiler slag) are produced in the furnaces of the boilers. During combustion a part of the ash particles sinters or melts together and falls down to the bottom of the boiler where they are removed and collected. These particles are called Bottom Ash (BA) in case of dry bottom boilers or Boiler Slag (BS) in case of wet bottom boilers. The smaller particles are leaving the furnace at the top and are collected by precipitation. These particles are called Fly Ash (FA)/Pulverized Fuel Ash (PFA) including Cenospheres.</p>																										
Mineralogy (% w/w)	<table border="0"> <tr> <td>Glass/amorphous material</td> <td>30 - 100</td> </tr> <tr> <td>Mullite [3Al₂O₃.2SiO₂]</td> <td>0 - 35</td> </tr> <tr> <td>Quartz [SiO₂]</td> <td>0 - 35</td> </tr> <tr> <td>Magnetite [Fe₃O₄]</td> <td>0 - 15</td> </tr> <tr> <td>Anhydrite [CaSO₄]</td> <td>0 - 15</td> </tr> <tr> <td>Anorthite [CaO.Al₂O₃.2SiO₂]</td> <td>0 - 15</td> </tr> </table>	Glass/amorphous material	30 - 100	Mullite [3Al ₂ O ₃ .2SiO ₂]	0 - 35	Quartz [SiO ₂]	0 - 35	Magnetite [Fe ₃ O ₄]	0 - 15	Anhydrite [CaSO ₄]	0 - 15	Anorthite [CaO.Al ₂ O ₃ .2SiO ₂]	0 - 15														
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Composition: main constituents	<p>Chemical analyses of ash, analyzed as elements and reported as the mass percent of each equivalent oxide :</p> <table border="1"> <thead> <tr> <th>Element</th> <th>FA,PFA / BA / BS</th> </tr> </thead> <tbody> <tr> <td>CaO</td> <td>0.1 - 45</td> </tr> <tr> <td>SiO₂</td> <td>20 – 76</td> </tr> <tr> <td>K₂O</td> <td>0.01 - 8</td> </tr> <tr> <td>SO₃</td> <td>0.01 - 15</td> </tr> <tr> <td>P₂O₅</td> <td>0.01 - 10</td> </tr> <tr> <td>MgO</td> <td>0.01 - 15</td> </tr> <tr> <td>Fe₂O₃</td> <td>0.01 - 27</td> </tr> <tr> <td>Al₂O₃</td> <td>5 - 40</td> </tr> <tr> <td>Na₂O</td> <td>0.01 - 8.0</td> </tr> <tr> <td>TiO₂</td> <td>0.01 - 8.0</td> </tr> <tr> <td>Loss on ignition (LOI)</td> <td>0.1 - 20</td> </tr> </tbody> </table> <table border="1"> <tr> <td>CaO_{free}</td> <td>0.01 - 9.0</td> </tr> </table> <p>Restriction regarding constituents</p> <p>The reference material for the registration dossier (IUCLID & CSR) will comply with:</p> <ol style="list-style-type: none"> 1. No substance that occurs in amounts > 1% is classified to the extent that the amount present requires a change in classification 2. Substances which are classified by the EU as CMR Cat. 1 or 2, neither PBT or vPvB are present in amounts > 0.1% nor substances of very high concern (SVHC) reported in quantities > 0.1%. 3. Substances for which Specific Concentration Limits (e.g. heavy metals), lower than 0.1 or 1% have been set in Annex VI to CLP are not present in amounts that would require additional classification and labelling. 4. Substances for which limit concentrations are given in any other EU Directive or Regulation such as Annex XVII of REACH are not present in amounts exceeding those limits. <p>Individual companies are advised to check their own impurities for specific concentration limits and to inform the Consortium about the identity of the impurities and the identified limits.</p>	Element	FA,PFA / BA / BS	CaO	0.1 - 45	SiO ₂	20 – 76	K ₂ O	0.01 - 8	SO ₃	0.01 - 15	P ₂ O ₅	0.01 - 10	MgO	0.01 - 15	Fe ₂ O ₃	0.01 - 27	Al ₂ O ₃	5 - 40	Na ₂ O	0.01 - 8.0	TiO ₂	0.01 - 8.0	Loss on ignition (LOI)	0.1 - 20	CaO _{free}	0.01 - 9.0
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