

Analyses performed by Incolab Services B.V.

Tests marked with (Q) are accredited by RvA

Tests marked with (A) are performed in accordance with the standard mentioned

Tests marked with (E) are performed equivalent to the standard mentioned

Tests marked with (I) are performed with in-house methods

Tests marked with (M) are performed in accordance with the standard mentioned, but on a matrix not included in the standard

Incolab Services B.V. is a recognized body for the analysis of Transportable Moisture Limit in coal in The Netherlands and Belgium

Test	Method	Coal ISO Standard	Coal ASTM Standard	Coke (ISO Standard)	Coke (ASTM Standard)	Petroleum coke	Solid Biofuels	Solid Recovered Fuels	Other matrix
Sampling and preparation									
Sampling	Manual sampling	ISO 18283 (A)	ASTM D 2234 / D 6883 (A)	ISO 18283 (A)	ASTM D 346 (A)	ASTM D 6970 / D 8145 (A)			
Sample preparation	Crushing, cutting, reduction	ISO 18283 (Q)(A)	ASTM D 2013 (Q)(A)	ISO 18283 (Q)(A)	ASTM D 2013 (Q)(A)	ASTM D 2013 (Q)(A)	ISO 14780 (Q)(A)	ISO 21646 (Q)(A)	
Transportable Moisture Limit	Modified Proctor Fagerberg for coal	IMSBC (A)	IMSBC (A)	-	-	-	-		
Proximate analysis									
Total Moisture (1-step, standard method)	Gravimetric method	ISO 589 B2 (Q)(A)	ASTM D 2961 (Q)(A)	ISO 579 (Q)(A)	ASTM D 2961 (Q)(M)	ASTM D 4931 (Q)(A)	ISO 18134-1 (Q)(A)	CEN/TS 15414-1 (Q)(A)	
Total Moisture (2-step, on request)	Gravimetric method	ISO 589 A2 (Q)(A)	ASTM D 3302 (Q)(A)	ISO 589 A2 (Q)(M)	ASTM D 3302 B (Q)(M)	ASTM D 4931 (Q)(A)	-	-	
Inherent Moisture	Gravimetric method	ISO 11722 (Q)(A)	ASTM D 3173 (Q)(A)	ISO 687 (Q)(A)	ASTM D 3173 (Q)(A)	ASTM D 4931 (Q)(A)	ISO 18134-3 (Q)(A)	ISO 21660-3 (Q)(A)	
Ash	Gravimetric method	ISO 1171 (Q)(A)	ASTM D 3174 (Q)(A)	ISO 1171 (Q)(A)	ASTM D 3174 (Q)(A)	ASTM D 4422 (Q)(A)	ISO 18122 (Q)(A)	ISO 21656 (Q)(A)	
Volatile Matter	Gravimetric method	ISO 562 (Q)(A)	ASTM D 3175 (Q)(A)	ISO 562 (Q)(A)	ASTM D 3175 (Q)(A)	ASTM D 6374 (Q)(A)	ISO 18123 (A)	ISO 22167 (A)	
Fixed Carbon	Calculation	ISO 17246 (Q)(A)	ASTM D 3172 (Q)(A)	ISO 17246 (Q)(A)	ASTM D 3172 (Q)(A)	ASTM D 3172 (Q)(M)	ISO 22167 (A)	ISO 22167 (A)	
Ultimate analysis									
Carbon (C)	IR detection	ISO 29541 (Q)(A)	ASTM D 5373 (Q)(A)	ISO 29541 (Q)(A)	ASTM D 5373 (Q)(A)	ASTM D 5291 (Q)(A)	ISO 16948 (Q)(A)	ISO 21663 (Q)(A)	
Hydrogen (H)	IR detection	ISO 29541 (Q)(A)	ASTM D 5373 (Q)(A)	ISO 29541 (Q)(A)	ASTM D 5373 (Q)(A)	ASTM D 5291 (Q)(A)	ISO 16948 (Q)(A)	ISO 21663 (Q)(A)	
Nitrogen (N)	Thermal conductivity	ISO 29541 (Q)(A)	ASTM D 5373 (Q)(A)	ISO 29541 (Q)(A)	ASTM D 5373 (Q)(A)	ASTM D 5291 (Q)(A)	ISO 16948 (Q)(A)	ISO 21663 (Q)(A)	
Sulfur (S)	IR detection	ISO 19579 (Q)(A)	ASTM D 4239 A (Q)(A)	ISO 19579 (Q)(A)	ASTM D 4239 A (Q)(A)	ASTM D 1552 A (Q)(A)	In-house (Q)(I)	In-house (Q)(I)	
Oxygen (O)	Calculation	ISO 1170 (Q)(A)	ASTM D 3176 (Q)(A)	ISO 1170 (Q)(A)	ASTM D 3176 (Q)(A)	ASTM D 3176 (Q)(M)	ISO 16993 (Q)(A)	ISO 16993 (Q)(M)	
CO ₂ Emission factor	Calculation	2003/87/EC (Q)(A)	2003/87/EC (Q)(A)	2003/87/EC (Q)(A)	2003/87/EC (Q)(A)	2003/87/EC (Q)(A)	2003/87/EC (Q)(A)	2003/87/EC (Q)(A)	
Calorific value									
Gross calorific value	Combustion calorimetry	ISO 1928 (Q)(A)	ASTM D 5865 (Q)(A)	ISO 1928 (Q)(A)	ASTM D 5865 (Q)(A)	ASTM D 5865 (Q)(A)	ISO 18125 (Q)(A)	ISO 21654 (Q)(A)	
Net calorific value	Calculation	ISO 1928 (Q)(A)	ASTM D 5865 (Q)(A)	ISO 1928 (Q)(A)	ASTM D 5865 (Q)(A)	ASTM D 5865 (Q)(A)	ISO 18125 (Q)(A)	ISO 21654 (Q)(A)	
Grindability	Hardgrove method	ISO 5074 (Q)(A)	ASTM D 409 (Q)(A)	-	-	ASTM D 5003 (Q)(A)	-	-	
Swelling properties	Heating in covered crucible	ISO 501 (Q)(A)	ASTM D 720 (Q)(A)	-	-	-	-	-	
Halogens									
Fluorine (F)	Hydropyrolysis / Ion chromatography	ISO 11724 (Q)(A)	ASTM D 8247 (Q)(A)	ISO 11724 (Q)(A)	ASTM D 8247 (Q)(A)	ASTM D 8247 (A)	in-house (A)(I)	in-house (A)(I)	
Chlorine (Cl)	Hydropyrolysis / Ion chromatography	ISO 18806 (Q)(A)	ASTM D 8247 (Q)(A)	ISO 18806 (Q)(A)	ASTM D 8247 (Q)(A)	ASTM D 8247 (A)	in-house (A)(I)	in-house (A)(I)	
Bromine (Br)	Hydropyrolysis / Ion chromatography	in-house (I)	in-house (I)	in-house (I)	in-house (I)	in-house (I)	in-house (A)(I)	in-house (A)(I)	
Fluorine (F)	High pressure combustion / IC	-	-	-	-	-	in-house (A)(I)	in-house (A)(I)	
Chlorine (Cl)	High pressure combustion / IC	-	-	-	-	-	in-house (A)(I)	in-house (A)(I)	
Bromine (Br)	High pressure combustion / IC	-	-	-	-	-	in-house (A)(I)	in-house (A)(I)	
Forms of Sulfur									
Sulfate sulfur	ICP-OES	-	ASTM D 8214 (Q)(A)	-	-	-	in-house (I)	-	
Pyritic sulfur	ICP-OES	-	ASTM D 8214 (Q)(A)	-	-	-	-	-	
Organic sulfur	ICP-OES	-	ASTM D 8214 (Q)(A)	-	-	-	-	-	
Major elements / ash composition									
<i>Elements in the product are calculated from the oxides</i>									
Silicon dioxide (SiO ₂)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	NTA 8200:2002 (Q)(A)	NTA 8200:2002 (M)	
Aluminium oxide (Al ₂ O ₃)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	NTA 8200:2002 (Q)(A)	NTA 8200:2002 (M)	
Iron oxide (Fe ₂ O ₃)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	NTA 8200:2002 (Q)(A)	NTA 8200:2002 (M)	
Calcium oxide (CaO)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	NTA 8200:2002 (Q)(A)	NTA 8200:2002 (M)	
Magnesium oxide (MgO)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	NTA 8200:2002 (Q)(A)	NTA 8200:2002 (M)	
Sodium oxide (Na ₂ O)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	NTA 8200:2002 (Q)(A)	NTA 8200:2002 (M)	
Potassium oxide (K ₂ O)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	NTA 8200:2002 (Q)(A)	NTA 8200:2002 (M)	
Manganese dioxide (MnO ₂)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	NTA 8200:2002 (Q)(A)	NTA 8200:2002 (M)	
Titanium dioxide (TiO ₂)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	in-house (Q)(I)	in-house (I)	
Phosphorus pentoxide (P ₂ O ₅)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	NTA 8200:2002 (Q)(A)	NTA 8200:2002 (M)	
Barium oxide (BaO)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	in-house (Q)(I)	in-house (I)	
Strontium oxide (SrO)	ICP-OES	-	ASTM D 6349 (Q)(A)	-	ASTM D 6349 (Q)(A)	-	in-house (Q)(I)	in-house (I)	
Sulfur trioxide (SO ₃)	IR detection	-	ASTM D 5016 (Q)(A)	-	ASTM D 5016 (Q)(A)	-	in-house (Q)(I)	in-house (I)	
Minor elements / Trace elements									
Antimony (Sb)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)	
Arsenic (As)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)	
Beryllium (Be)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		in-house (Q)(I)	EN 15411 (Q)(A)	
Bismuth (Bi)	ICP-MS	-	in-house (I)	-	in-house (I)		in-house (I)	in-house (I)	
Boron (B)	ICP-OES	-	ASTM D 8213 (Q)(A)	-	in-house (I)		in-house (I)	in-house (I)	
Cadmium (Cd)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)	
Cerium (Ce)	ICP-MS	-	in-house (I)	-	in-house (I)		in-house (I)	in-house (I)	
Chromium (Cr)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)	
Cobalt (Co)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)	
Copper (Cu)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)	
Gallium (Ga)	ICP-MS	-	in-house (I)	-	in-house (I)		in-house (I)	in-house (I)	
Germanium (Ge)	ICP-MS	-	in-house (I)	-	in-house (I)		in-house (I)	in-house (I)	

Lead (Pb)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)
Lithium (Li)	ICP-MS	-	in-house (I)	-	in-house (I)		in-house (I)	in-house (I)
Manganese (Mn)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)
Mercury (Hg)	AAS	-	ASTM D 6722 (Q)(A)	-	ASTM D 6722 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)
Molybdenum (Mo)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)
Nickel (Ni)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)
Scandium (Sc)	ICP-MS	-	in-house (I)	-	in-house (I)		in-house (I)	in-house (I)
Selenium (Se)	ICP-MS	-	in-house (Q)(I)	-	in-house (Q)(I)		in-house (Q)(I)	in-house (Q)(I)
Silver (Ag)	ICP-MS	-	in-house (I)	-	in-house (I)		in-house (I)	in-house (I)
Tellurium (Te)	ICP-MS	-	in-house (Q)(I)	-	in-house (Q)(I)		in-house (Q)(I)	EN 15411 (Q)(A)
Thallium (Tl)	ICP-MS	-	in-house (Q)(I)	-	in-house (Q)(I)		in-house (Q)(I)	EN 15411 (Q)(A)
Tin (Sn)	ICP-MS	-	in-house (Q)(I)	-	in-house (Q)(I)		in-house (Q)(I)	in-house (Q)(I)
Uranium (U)	ICP-MS	-	in-house (I)	-	in-house (I)		in-house (I)	in-house (I)
Vanadium (V)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)
Zinc (Zn)	ICP-MS	-	ASTM D 6357 (Q)(A)	-	ASTM D 6357 (Q)(A)		ISO 16968 (Q)(A)	EN 15411 (Q)(A)
Ash fusibility / ash melting	High temperature tube	ISO 540 (Q)(A)	ASTM D 1857 (Q)(A)	ISO 540 (Q)(A)	ASTM D 1857 (Q)(A)	-	ISO 21404 (A)	CEN/TR 15404 (A)
Biomass content	Selective dissolution method	-	-	-	-	-	ISO 21644 (M)	ISO 21644 (Q)(A)
Density								
Apparent density	Water replacement	-	-	-	ASTM D 167 (E)	-	-	-
Relative density	Pyknometry	-	-	-	ASTM D 167 (E)	-	-	-
Porosity	Calculation	-	-	-	ASTM D 167 (A)	-	-	-