Central Mining Institute
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AB 069

PHYSICOCHEMICAL ANALYSIS

TEST REPORT 532/1/2021

Page number : 1
Number of pages : 3
Katowice, date: 05.05.2021

Customer: **Department of Acoustics, Electronics and IT Solutions**
Central Mining Institute

Analyses for particular research methods are made according to the standards and the instructions listed below:

Determinations	Research methods	State				Made according to
		As analysed	As received	Dry	Dry, Ash Free	
		Symbol				
Transient moisture content	PN-G-04511:1980 pkt. 2.1*	-	W_{ex}^{r}	-	-	x
Total moisture content	PN-G-04511:1980 pkt. 2.3.4*	-	W_{t}^{r}	-	-	
	IC-29.1, edition 18 from 24.06.2019 r.					x
Moisture content in analytical sample	PN-G-04560:1998	W^{a}	-	-	-	x
	PN-G-04511:1980 pkt. 2.4.1*					
	PN-G-04511:1980 pkt. 2.4.2*					
Ash content	PN-G-04560:1998	A^{a}	A^{r}	A^{d}	-	x
	PN-ISO 1171:2002	A	A_{ar}	A_{d}	-	
Volatile matter content	PN-G-04516:1998	V^{a}	V^{r}	V^{d}	V^{daf}	x
	PN-ISO 562:2000*	V	V_{ar}	V_{d}	V_{daf}	
	PN-G-04560:1998	V^{a}	V^{r}	V^{d}	V^{daf}	
Gross calorific value	PN-G-04513:1981*	Q_{s}^{a}	Q_{s}^{r}	Q_{s}^{d}	Q_{s}^{daf}	x
	PN-ISO 1928:2002	$q_{v,gr,ad}$	$q_{v,gr,ar}$	$q_{v,gr,d}$	$q_{v,gr,daf}$	
Net calorific value	PN-G-04513:1981*	Q_{i}^{a}	Q_{i}^{r}	Q_{i}^{d}	Q_{i}^{daf}	x
	PN-ISO 1928:2002	$q_{v,net,ad}$	$q_{v,net,ar}$	$q_{v,net,d}$	$q_{v,net,daf}$	
Caking power of hard coal by the Roga index	PN-G-04518:1981*	RI	-	-	-	
The crucible swelling number	PN-ISO 501:2007	FSI	-	-	-	x
Audibert - Arnu dilatometer test	PN-G-04517:1981*	a, b, t_I, t_{II}, t_{III}	-	-	-	
Coal type according to	PN-G-97002:2018-11	-	-	-	-	
International classification of coal	PN-ISO 11760:2007	-	-	-	-	x

The test results refer to sample delivered x

The results of the tests relate to a sample taken by GIG samplers within the scope of accreditation AB 069

The results of the tests relate to a sample taken by GIG samplers outside the scope of accreditation AB 069

*- standard withdrawn without replacement,

Report approved and authorized by:

KIEROWNIK
Zakładu Oceny Jakości Paliw Stałych
GŁÓWNEGO INSTYTUTU GÓRNICTWA
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Katowice, date: 05.05.2021

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Analyses for particular research methods are made according to the standards and the instructions listed below:

Determinations	Research methods	State				Made according to
		As analysed	As received	Dry	Dry, Ash Free	
		Symbol				
Total sulphur content	PN-G-04584:2001	S_t^a	S_t^r	S_t^d	-	x
	PN-ISO 334:1997	W_s	$W_{s,ar}$	$W_{s,d}$	$W_{s,daf}$	
Ash sulphur content	PN-G-04584:2001	S_A^a	S_A^r	S_A^d	-	x
Combustible sulphur content	PN-G-04584:2001	S_c^a	S_c^r	S_c^d	-	x
Pyritic sulphur content	PN-G-04582:1997	S_p^a	S_p^r	S_p^d	-	
Sulphate sulphur content	PN-G-04582:1997	S_{SO4}^a	S_{SO4}^r	S_{SO4}^d	-	
Organic sulphur content	IC-29.1, edition 18 form 24.06.2019 r.	S_o^a	S_o^r	S_o^d	-	
Total carbon content	PN-G-04571:1998	C_t^a	C_t^r	C_t^d	-	x
Organic carbon content	IC-29.1, edition 18 form 24.06.2019 r.	C_o^a	C_o^r	C_o^d	C_o^{daf}	
Total hydrogen content	PN-G-04571:1998	H_t^a	H_t^r	H_t^d	-	x
Nitrogen content	PN-G-04571:1998	N^a	N^r	N^d	N^{daf}	x
Carbonate carbon dioxide content	PN-ISO 925:2002	W_{CO2}	-	-	-	x
Carbonate carbon content	PN-ISO 925:2002	W_C	-	-	-	x
True relative density	PN-G-04537:1998	d_r^a	-	-	-	x
Characteristic ash fusibility temperatures	PN-ISO 540:2001	DT, ST HT, FT	-	-	-	
Hardgrove grindability index	PN-ISO 5074:2002	HGI	-	-	-	
Reflectance of vitrinite	PN-ISO 7404-5:2002	R, δ	-	-	-	x
Maceral groups composition	PN-ISO 7404-3:2001	V, L, I, MM	-	-	-	x
Fixed carbon index	PN-G-04516:1998	(fixed carbon)^a	-	-	-	x
Combustible parts content	IC-29.1, edition 18 form 24.06.2019 r.	-	-	-	-	x
Oxygen content	IC-29.1, edition 16 form 25.05.2018 r.	O_d^a	O_d^r	O_d^d	O_d^{daf}	x

*- standard withdrawn without replacement

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PHYSICOCHEMICAL ANALYSIS

TEST REPORT 532/1/2021

Katowice, date: 05.05.2021

Customer:	**Department of Acoustics, Electronics and IT Solutions**	**Date of sampling:**	-
Sample identification:	Sample: hard coal	**Date of delivery:**	16.02.2021
Sample customer description:	Coal sample	**Date of test performance:**	16.02.-17.03.2021
		Customer sample number:	-
		Package description:	Plastic bag
Sample identification number:	**SW 2182**		

Determinations		Unit	Delivered sample	Enriched sample
			Result together with expanded uncertainty (k=2, P=95)	
As analysed				
Moisture content in analytical sample		%	5,06 ± 0,63	-
Ash content		%	4,80 ± 0,34	-
Volatile matter content		%	33,94 ± 1,18	-
Gross calorific value		kJ/kg	28617 ± 152	-
Net calorific value		kJ/kg	27465	-
Caking power by Roga Index		-	-	-
Crucible swelling number		-	0 ± 1	-
Dilatometric indices	contraction	%	-	-
	dilatation	%	-	-
	Temperature:			
	softening	°C	-	-
	contraction	°C	-	-
	dilatation	°C	-	-
Ash fusibility temperatures		Atmosphere:	oxidizing*	reducing*
	deformation	°C	-	-
	softening	°C	-	-
	melting	°C	-	-
	flow	°C	-	-
Fixed carbon index		%	56,20	-
As received				
Transient moisture content		%	2,61	-
Total moisture content		%	7,54	-
Ash content		%	4,67	-
Dry				
Ash content		%	5,06	-
Total sulphur content		%	0,82	-
Dry, Ash Free				
Volatile matter content		%	37,65	-
Coal type according to		-	-	

Determinations	Unit	Delivered sample	Enriched sample
		Result together with expanded uncertainty (k=2, P=95)	
Total sulphur content	%	0,78 ± 0,08	-
Pyritic sulphur content	%	-	-
Sulphate sulphur content	%	-	-
Ash sulphur content	%	0,14 ± 0,09	-
Combustible sulphur content	%	0,64	-
Organic sulphur content	%	-	-
Total carbon content	%	71,50 ± 1,05	-
Organic carbon content	%	-	-
Total hydrogen content	%	4,71 ± 0,40	-
Nitrogen content	%	1,40 ± 0,22	-
Oxygen content	%	11,89	-
Carbonate carbon dioxide content	%	0,04** ± 0,02	-
Carbonate carbon content	%	0,01	-
True relative density	g/cm^3	1,388 ± 0,18	-
Hardgrove grindability index	-	-	-
Reflectance of vitrinite R	%	0,57 ± 0,03	-
Standard deviation R	%	0,05	-
Vitrinite content	%	64 ± 7	-
Liptinite (exinite) content	%	10 ± 7	-
Inertinite content	%	12 ± 7	-
Mineral matter content	%	14 ± 9	-
Combustible parts content	%	-	-
Volatile matter content	%	33,05	-
Total sulphur content	%	0,76	-
Net calorific value	kJ/kg	26684	-
Gross calorific value	kJ/kg	-	-
Net calorific value	kJ/kg	-	-
Gross calorific value	kJ/kg	31747	-
International classification of coal		05 0 1 3 0 36 05 08 31	

* oxidizing atmosphere - air, reducing atmosphere - $CO+CO_2$ mixture in voluminal ratio 3:2

* * Measurement result made by accreditated method outside the measurement range

The annex to the test report: reflectogram

Combustible parts content 90,14 %

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