

Supplementary material to

## Use of a mixture of coal and oil as an additive for selective reduction of lateritic ore by the Caron process

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Hem. Ind. **78(1)** 17-27 (2024); <https://doi.org/10.2298/HEMIND230118017A>

Table S-1. Chemical and physical characteristics of the ore reduced by using the additive FO-2.5 over time

Day	Content, wt.%									$\rho / \text{kg m}^{-3}$	Magnetic fraction, %
	Ni	Co	Fe	Ni°	Fe°	Fe <sup>2+</sup>	FeO	S	C		
1	1.41	0.107	45.99	0.98	2.66	24.34	19.55	0.81	1.34	4700	60.63
2	1.39	0.113	45.85	1.05	2.38	24.17	19.61	0.77	1.20	4680	58.82
3	1.37	0.108	46.10	1.07	2.59	27.31	18.76	0.83	1.28	4682	57.74
4	1.36	0.112	46.32	1.02	2.30	25.65	20.19	0.83	1.30	4697	60.11
5	1.36	0.115	46.55	1.04	2.14	26.67	19.95	0.75	1.25	4690	60.62

Table S-2. Chemical and physical characteristics of the ore reduced by using the additive BC2-FO1.25 over time

Day	Content of lateritic ore, wt.%									$\rho / \text{kg m}^{-3}$	Magnetic fraction, %
	Ni	Co	Fe	Ni°	Fe°	Fe <sup>2+</sup>	FeO	S	C		
1	1.34	0.117	46.25	1.12	2.83	24.91	20.18	0.55	1.29	4570	58.59
2	1.40	0.115	46.68	1.06	2.75	24.84	20.02	0.64	1.36	4562	59.16
3	1.31	0.109	46.50	1.04	2.79	25.00	19.97	0.68	1.41	4559	57.34
4	1.34	0.115	46.33	1.07	2.69	25.10	19.61	0.59	1.41	4545	61.63
5	1.33	0.106	46.91	1.09	2.85	25.44	19.70	0.56	1.37	4565	61.44

Table S-3. CO/CO<sub>2</sub> profile in the pilot furnace atmosphere using the FO-2.5 additive

Hearths	Sample 1				Sample 2				Sample 3			
	Content, vol.%			CO/CO <sub>2</sub> volume ratio	Content, vol.%			CO/CO <sub>2</sub> volume ratio	Content, vol.%			CO/CO <sub>2</sub> volume ratio
	O <sub>2</sub>	CO	CO <sub>2</sub>		O <sub>2</sub>	CO	CO <sub>2</sub>		O <sub>2</sub>	CO	CO <sub>2</sub>	
0	0.9	5.5	13.9	0.396	1.0	5.3	13.7	0.387	1.0	5.0	13.30	0.376
2	0.9	6.6	13.4	0.493	1.1	7.0	13.0	0.538	1.2	6.5	12.80	0.508
4	1.2	6.5	13.0	0.500	1.0	7.1	13.0	0.546	1.1	7.3	12.70	0.575
6	1.1	6.6	13.2	0.500	1.1	7.0	12.8	0.547	1.0	6.7	12.60	0.532
8	0.0	6.8	12.4	0.548	0.0	7.2	12.6	0.571	0.0	6.9	12.40	0.556
10	0.0	7.7	12.4	0.621	0.0	7.9	12.8	0.617	0.0	7.8	12.20	0.639
12	0.0	8.2	12.6	0.651	0.0	8.6	12.6	0.683	0.0	8.3	12.40	0.669
14	0.0	8.6	11.7	0.735	0.0	8.6	12.3	0.699	0.0	8.5	12.00	0.708
16	0.0	6.0	14.8	0.405	0.0	6.8	14.4	0.472	0.0	6.4	14.00	0.457



Table S-4. CO/CO<sub>2</sub> profile in the pilot furnace atmosphere using the BC2-FO1.25 additive

Hearths	Sample 1				Sample 2				Sample 3			
	Content, vol.%			CO/CO <sub>2</sub> volume ratio	Content, vol.%			CO/CO <sub>2</sub> volume ratio	Content, vol.%			CO/CO <sub>2</sub> volume ratio
	O <sub>2</sub>	CO	CO <sub>2</sub>		O <sub>2</sub>	CO	CO <sub>2</sub>		O <sub>2</sub>	CO	CO <sub>2</sub>	
0	1.2	5.0	13.2	0.379	0.8	4.2	13.9	0,302	1.1	4.5	13.7	0.328
2	0.8	5.2	13.0	0.400	1.0	4.8	13.4	0,358	1.0	5.0	13.1	0.382
4	1.0	5.2	13.0	0.400	1.0	5.6	13.7	0,409	0.9	5.5	13.3	0.414
6	0.8	6.3	12.2	0.516	0.6	6.5	12.2	0,533	0.9	6.5	12.3	0.528
8	0.0	7.6	12.2	0.623	0.0	7.2	11.6	0,621	0.0	7.2	12.0	0.600
10	0.0	8.6	11.3	0.761	0.0	9.0	11.0	0,818	0.0	8.7	11.1	0.784
12	0.0	9.2	10.8	0.852	0.0	9.8	10.0	0,980	0.0	9.5	10.5	0.905
14	0.0	11.2	10.0	1.120	0.0	11.6	9.6	1,208	0.0	11.6	11.0	1.055
16	0.0	9.6	10.3	0.932	0.0	8.8	9.9	0,889	0.0	9.8	10.1	0.970

Table S-5. Ni and Co extraction results when using the FO-2.5 additive over time

Day	Content of educed and leached ore, wt.%			Extractions, %	
	Ni	Co	Fe	Ni	Co
1	0.296	0.077	47.104	78.71	34.35
2	0.290	0.076	48.634	79.80	37.40
3	0.292	0.077	48.250	79.50	36.07
4	0.298	0.078	48.458	79.14	35.69
5	0.298	0.078	48.087	78.98	35.19

Table S-6. Ni and Co extraction results when using the BC2-FO1.25 additive over time

Day	Content of reduced and leached ore, wt.%			Extractions, %	
	Ni	Co	Fe	Ni	Co
1	0.237	0.066	48.390	83.50	45.99
2	0.240	0.068	48.573	83.35	44.29
3	0.271	0.069	48.620	81.22	43.73
4	0.268	0.070	47.990	81.22	42.24
5	0.255	0.069	48.282	82.20	43.27