

# **Investigation on Pulverized Coal Char Oxy-Combustion Behavior at Moderate and High Temperatures: Experiments and a Novel Developed Kinetics Modeling**

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## Supporting Information for Publication

(1) The experimental properties and parameters for char burning under O<sub>2</sub>/CO<sub>2</sub>/N<sub>2</sub>/A<sub>r</sub> atmosphere are shown in Table 1S. The detailed experiments have eight experimental cases which include six oxy-char coombustion experimental cases, i.e., a, b, c, e, f, g, and two compared char combustion experimental cases in conventional air combustion conditions, i.e., d, h. in 1273K and 1773K. The detailed eight cases have 27%O<sub>2</sub>/73%CO<sub>2</sub>, 27%O<sub>2</sub>/73%A<sub>r</sub>, 73%CO<sub>2</sub>/27%A<sub>r</sub>, 21%O<sub>2</sub>/79%N<sub>2</sub>, in 1273K and 1773K, respectively.

**Table 1S. Experimental properties and parameters for char burning under O<sub>2</sub>/CO<sub>2</sub>/N<sub>2</sub>/A<sub>r</sub> atmospheres**

Cases	Oxy-char			Air-char
	27%O <sub>2</sub> /73%CO <sub>2</sub>	27%O <sub>2</sub> /73%A <sub>r</sub>	73%CO <sub>2</sub> /27%A <sub>r</sub>	21%O <sub>2</sub> /79%N <sub>2</sub>
O <sub>2</sub> flow rate / l/min	0.11	0.11	-	0.08
CO <sub>2</sub> flow rate / l/min	0.29	-	0.29	-
N <sub>2</sub> flow rate / l/min	-	-	-	0.32
A <sub>r</sub> flow rate / l/min	-	0.29	0.11	-
Total flow rate / l/min	0.40	0.40	0.40	0.40
Index	a	b	c	d
Char initial mass /g	5.00-0.76	5.00-0.14	5.00-0.56	5.00-0.41
Temperature /K	1273	1273	1273	1273
Index	e	f	g	h
Char initial mass /g	5.00+0.00	5.00+0.10	5.00+0.07	5.00+0.01

Temperature /K	1773	1773	1773	1773
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(2) Binary gas mass diffusion coefficients of oxygen, nitrogen, carbon dioxide and argon are shown in Table 2S. It shows that the mass diffusion coefficient of oxygen in nitrogen atmosphere is about 1.27 times that in carbon dioxide atmosphere and is nearly similar as 1.04 times that in argon atmosphere.

**Table 2S. Binary gas mass diffusion coefficients for O<sub>2</sub>-N<sub>2</sub>, O<sub>2</sub>-CO<sub>2</sub>, O<sub>2</sub>-A<sub>r</sub> (unit: m<sup>2</sup>/s)**

		N <sub>2</sub>	CO <sub>2</sub>	A <sub>r</sub>
273K	O <sub>2</sub>	1.76E-05	1.39E-05	1.69E-05
1273K	O <sub>2</sub>	2.61E-04	2.05E-04	2.50E-04
1773K	O <sub>2</sub>	4.66E-04	3.67E-04	4.47E-04