Supplementary material

Effect of a HF-HF/HCl treatment of 26 coals on their composition and pyrolysis behavior

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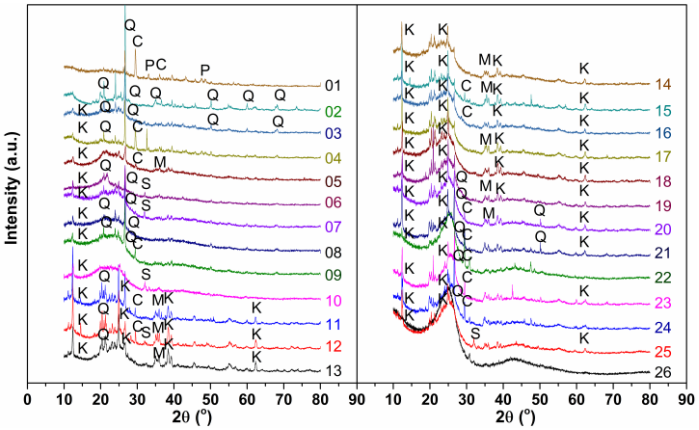

Figure S1. XRD of R-coals. K-Kaolinite; C-Calcium carbonate; P-Pyrite; S-Siderite; Q-Quartz; M-Magnetite

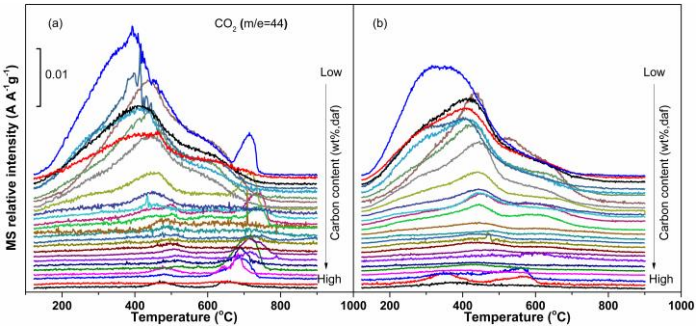

Figure S2. The MS signal of CO_2 of R-coals (a) and D-coals (b)

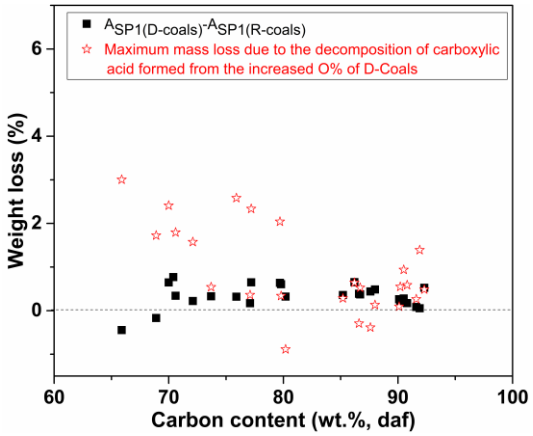

Figure S3. Comparison of the increased A_{SP1} by the acid treatment ($A_{sp1(D\text{-}coals)}$ - $A_{sp1(R\text{-}coals)}$) with the maximum mass loss due to the decomposition of carboxylic acid, assuming the increased O% in D-coals all form carboxylic acid.

Table S1. Temperature of removing crystal water from clay minerals in coal

Mineral species	Mineral name	Chemical formula	Decrystallization water temperature (°C)
Clay	Kaolinite	$Al_2Si_2O_5(OH)_4$	450[1, 2]
	Illite	$K_{1.5}Al_4(Si_{6.5}Al_{1.5})O_{20}(O)_4$	200-600[3]
	Montmorillonite	$(Na, Ca)_{0.33}(Al, Mg)_2[Si_4O_{10}] (OH)_2 \cdot nH_2O$	600-700[4]
	Chlorite	$(Mg\ Fe\ Al)_6\ (Al\ Si)_4O_{10}(OH)_8$	600-900[5]
	Sericite	$K_{0.5\text{-}1}\ (Al, Fe, Mg)_2\ (Si, Al)_4O_{10}(OH)_2 \cdot nH_2O$	750-820[4]
	Analcite	$NaAlSi_2O_6 \cdot H_2O$	490-600[6]
	Muscovite	$K_2O \cdot 3Al_2O_3 \cdot 6SiO_2 \cdot 2H_2O$	450-700[1]
	Clinoptilolite	$KNa_2Ca_2(Si_29Al7)\ O_{72} \cdot 32H_2O$	230-350[7]
	Heulandite	$CaA1_2Si_7O_{18} \cdot 6H_2O$	80-450[6]

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