

Supplementary Information for

Isotopic homogenization and scrambling associated with oxygen isotopic exchange on hot platinum: studies on gas pairs (O₂, CO₂) and (CO, CO₂)

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Table S1. The analytical data related to the catalysis induced exchange (for IISc experiments only) are given in supplementary Table 1 for O₂-CO₂

Table S2. The analytical data related to the catalysis induced exchange for δ¹⁸O change in case of CO-CO₂ exchange is given in Supplementary Table 2

Table S3. The analytical data related to the catalysis induced exchange for δ¹³C change in case of CO-CO₂ exchange is given in Supplementary Table 3

Table S1: Analytical data on isotope ratios of CO₂ and O₂ after heating in quartz tube at various temperatures with or without platinum. Linde CO₂ represents heated gas without platinum. δ'-values are in ‰ relative to VSMOW where δ'¹⁸O=1000*ln(1+δ¹⁸O/1000) and δ'¹⁷O=1000*ln(1+ δ¹⁷O/1000) are used instead of simple δ (Miller, 2002). Before and after indicate pre-exchange and post- exchange composition of the gases

Sample	O ₂	CO ₂	Time (hrs)	Temp	CO ₂ before δ' ¹⁸ O VSMOW	CO ₂ after δ' ¹⁸ O VSMOW	O ₂ before δ' ¹⁸ O VSMOW	O ₂ after δ' ¹⁸ O VSMOW	O ₂ before δ' ¹⁷ O VSMOW	O ₂ after δ' ¹⁷ O VSMOW	¹⁸ O change CO ₂	¹⁸ O change O ₂	Δ ₄₇ change
CO ₂ exchange with O ₂ with platinum													
1	30.0	31.0	4	700	24.73	3.00	-21.72	1.40	-11.45	0.58	-21.73	23.12	-0.65
2	22.1	20.0	2	700	24.75	2.96	-21.38	1.24	-11.24	0.46	-21.79	22.62	-0.47
3	32.6	35.0	1	700	24.72	6.85	-21.55	-2.67	-11.36	-1.57	-17.88	18.88	-0.78
4	47.1	48.8	22	700	24.87	2.06	-21.88	2.40	-11.63	0.99	-22.81	24.27	-0.84
5	31.8	28.1	2	700	24.68	1.95	-21.88	-0.09	-11.54	-0.30	-22.74	21.78	-0.86
6	31.5	27.8	2	700	25.28	2.93	-21.93	0.08	-11.58	-0.23	-22.35	22.01	-0.54
7	31.0	27.8	2	700	24.85	4.44	-21.66	0.30	-11.46	-0.12	-20.42	21.96	-0.49
8	31.1	29.0	2	600	24.90	4.04	-21.80	-0.49	-11.59	-0.49	-20.86	21.30	-0.56
9	30.8	28.7	2	600	24.84	3.22	-21.90	0.16	-11.62	-0.22	-21.62	22.06	-0.74
10	30.3	28.1	2	500	24.75	9.03	-21.91	-5.79	-11.58	-3.21	-15.72	16.12	-0.57
11	30.3	27.9	2	350	24.78	22.80	-21.90	-20.04	-11.60	-11.07	-1.98	1.86	-0.43
12	30.3	29.0	2	300	24.61	24.52	-21.79	-21.85	-11.52	-11.53	-0.09	-0.06	-0.03
13	30.4	27.6	2	800	24.90	2.02	-21.91	0.75	-11.59	0.12	-22.88	22.66	-0.70
14	30.0	28.3	2	800	24.78	2.06	-21.98	1.40	-11.66	0.48	-22.72	23.38	-0.95
15	30.2	28.5	2	300	24.70	24.45	-22.05	-21.46	-11.63	-11.34	-0.25	0.60	-0.45
16	30.1	29.0	2	400	25.12	21.21	-21.87	-16.41	-11.58	-8.73	-3.90	5.46	-0.55
17	30.1	29	2	600	24.39	4.95	-21.90	-2.88	-11.59	-1.73	-19.44	19.01	-0.64
18	30.3	29	2	800	24.64	0.76	-21.90	0.93	-11.60	0.24	-23.88	22.84	-0.98
19	29.5	29	2	700	24.55	1.48	-21.86	0.11	-11.55	-0.21	-23.07	21.97	-0.96
CO ₂ exchange with O ₂ without platinum													
20 (no Pt)	29.6	28.5	2	800	24.70	22.93	-21.85	-20.26	-11.56	-10.73	-1.77	1.59	1.15
21 (no Pt)	29.5	28.3	2	700	24.74	24.50	-21.88	-21.52	-11.59	-11.41	-0.24	0.36	-0.57
CO ₂ heated without O ₂ and without platinum													
Linde CO ₂													
22 Heated gas	NA	50.0	5	1000	24.49	21.50	NA	NA	NA	NA	-2.99	NA	

Table S2: Analytical data on $\delta^{18}\text{O}$ values (in ‰ relative to VSMOW) pertaining to CO-CO₂ exchange along with blank runs with/without platinum, before and after indicate Pre and Post Exchange compositions

Sample	CO ₂	CO	Time (hrs)	Temp (°C)	CO ₂ before	CO ₂ after	Change in $\delta^{18}\text{O}$	Change in $\delta^{18}\text{O}$	CO before	CO after	Change in $\delta^{18}\text{O}$
	μmol	μmol			$\delta^{18}\text{O}$ VSMOW	$\delta^{18}\text{O}$ VSMOW	CO ₂	mass adjusted	$\delta^{18}\text{O}$ VSMOW	$\delta^{18}\text{O}$ VSMOW	CO
CO_CO ₂ _1	19	38	4.0	530	24.68	-18.11	-42.79	-42.79	NM	NM	NM
CO_CO ₂ _2	19.2	35.7	4.5	770	24.35	-26.80	-51.15	-55.02	NM	NM	NM
CO_CO ₂ _3	25	34	15.0	700	24.90	-56.47	-81.37	-119.66	-328.80	-208.68	120.12
CO_CO ₂ _4	45	34	15.5	700	24.84	-26.84	-51.68	-136.80	-328.80	-184.49	144.31
CO_CO ₂ _5	28	46	25.0	700	24.86	-94.33	-119.20	-145.11	-328.80	-179.25	149.55
CO_CO ₂ _6	27	44	1.0	700	24.72	13.09	-11.63	-14.28	-328.80	-312.51	16.29
Blank CO ₂ (without CO, with Pt)_7	61	NA	4.0	660	24.85	24.87	-0.02	NA	NA	NA	NA
Blank CO (without CO ₂ , with Pt)_8	NA	32.1	4.0	700	NA	NA	NA	NA	-328.80	-330.10	-1.30
Blank CO ₂ + CO (without Pt)_9	24	28	17.0	700	24.69	-16.29	-40.99	-70.26	-328.80	-255.77	73.03
Blank CO ₂ + CO (without Pt)_10	24	30	15.0	700	24.91	-16.11	-41.02	-65.63	-328.80	-261.82	66.98

Table S3: Analytical data on $\delta^{13}\text{C}$ values (in ‰ relative to VPDB) pertaining to CO-CO₂ exchange on hot platinum along with blanks with or without platinum; before and after indicate pre and post-exchange compositions. Mass adjusted means multiplied by CO₂/CO ratio

Sample	CO ₂	CO	CO ₂ before	CO ₂ after	$\delta^{13}\text{C}$ change	CO before	CO after	$\delta^{13}\text{C}$ change
	μmol	μmol	$\delta^{13}\text{C}$ VPDB	$\delta^{13}\text{C}$ VPDB	Mass adjusted	$\delta^{13}\text{C}$ VPDB	$\delta^{13}\text{C}$ VPDB	in CO
CO_CO ₂ _1	19	38	-3.8	-29.9	-13.1			
CO_CO ₂ _2	19.2	35.7	-4	-29.3	-13.7			
CO_CO ₂ _3	25	34	-3.7	-32	-20.8	-683.2	-670.6	12.6
CO_CO ₂ _4	45	34	-3.7	-21.2	-23.1	-683.2	-662.5	20.7
CO_CO ₂ _5	28	46	-3.7	-44.7	-25	-683.2	-669.2	14
CO_CO ₂ _6	27	44	-3.8	-14.7	-6.7	-683.2	-676.7	6.5
Blank CO ₂ (without CO, with Pt)_7	61	NA	-3.7	-3.7	0	NA	NA	NA
Blank CO (without CO ₂ , with Pt)_8	NA	32.1	NA	NA	NA	-683.2	-680.3	2.9
Blank CO ₂ + CO (without Pt)_9	24	28	-3.8	-19.9	-13.9	-683.2	-679.3	3.9
Blank CO ₂ + CO (without Pt)_10	24	30	-3.7	-22.8	-15.3	-683.2	-673.1	10.1