

Supporting Information

Table S1 Mössbauer spectrum fitting results of precipitated iron catalysts with chlorine after reduction and Fischer-Tropsch synthesis reaction.

Catalyst	IS ($\text{mm}\cdot\text{s}^{-1}$)	QS ($\text{mm}\cdot\text{s}^{-1}$)	Hhf (T)	Content (%)	Phase
Cl0 after reduction	0.40	0.03	50.48	26.95	$\text{Fe}_3\text{O}_4(\text{A})$
	0.54	-0.13	46.83	35.89	$\text{Fe}_3\text{O}_4(\text{B})$
	0.40	0.07	25.42	7.42	$\text{Fe}_5\text{C}_2(\text{I})$
	0.29	0.09	22.0	17.69	$\text{Fe}_5\text{C}_2(\text{II})$
	0.37	0.15	12.77	6.63	$\text{Fe}_5\text{C}_2(\text{III})$
	0.32	0.11	26.0	4.05	$\text{Fe}_3\text{C}(\text{I})$
	0.40	0.13	24.3	1.36	$\text{Fe}_3\text{C}(\text{II})$
Cl01 after reduction	0.40	0.05	50.70	46.55	$\text{Fe}_3\text{O}_4(\text{A})$
	0.54	-0.13	46.90	43.18	$\text{Fe}_3\text{O}_4(\text{B})$
	0.25	-0.10	26.00	3.10	$\text{Fe}_5\text{C}_2(\text{I})$
	0.33	-0.08	23.00	3.27	$\text{Fe}_5\text{C}_2(\text{II})$
	0.40	0.30	11.50	3.91	$\text{Fe}_5\text{C}_2(\text{III})$
	0.34	0.25	24.61	0	$\text{Fe}_3\text{C}(\text{I})$
	0.39	-0.30	24.30	0	$\text{Fe}_3\text{C}(\text{II})$
Cl01 after FT	0.40	0.05	50.68	27.97	$\text{Fe}_3\text{O}_4(\text{A})$
	0.58	-0.19	46.90	26.13	$\text{Fe}_3\text{O}_4(\text{B})$
	0.40	0.08	25.36	9.11	$\text{Fe}_5\text{C}_2(\text{I})$
	0.33	-0.04	22.00	22.04	$\text{Fe}_5\text{C}_2(\text{II})$
	0.28	-0.02	12.39	9.81	$\text{Fe}_5\text{C}_2(\text{III})$
	0.29	0.19	26.00	3.93	$\text{Fe}_3\text{C}(\text{I})$
	0.21	-0.30	25.00	1.01	$\text{Fe}_3\text{C}(\text{II})$
Cl1 after FT	0.40	0.03	50.91	36.04	$\text{Fe}_3\text{O}_4(\text{A})$
	0.63	-0.20	46.90	34.81	$\text{Fe}_3\text{O}_4(\text{B})$
	0.34	0.19	25.47	5.92	$\text{Fe}_5\text{C}_2(\text{I})$
	0.37	-0.05	22.00	13.00	$\text{Fe}_5\text{C}_2(\text{II})$
	0.30	0.08	11.50	6.41	$\text{Fe}_5\text{C}_2(\text{III})$
	0.40	-0.21	26.00	3.17	$\text{Fe}_3\text{C}(\text{I})$
	0.20	-0.30	24.30	0.65	$\text{Fe}_3\text{C}(\text{II})$

Table S2 Binding energy of Cl0 and Cl1 before and after Fischer-Tropsch synthesis

Catalyst	Core-level	Binding Energy (eV)
Cl0	Fe 2p _{3/2}	711.55
	Fe 2p _{1/2}	724.45
Cl1	Fe 2p _{3/2}	711.50
	Fe 2p _{1/2}	724.60
	Cl 2p _{3/2}	198.55
	Cl 2p _{1/2}	200.18
Cl0 after FT	Fe 2p _{3/2}	710.51
	Fe 2p _{1/2}	723.40
Cl1 after FT	Fe 2p _{3/2}	710.82
	Fe 2p _{1/2}	724.55
	Cl 2p _{3/2}	198.19
	Cl 2p _{1/2}	199.85

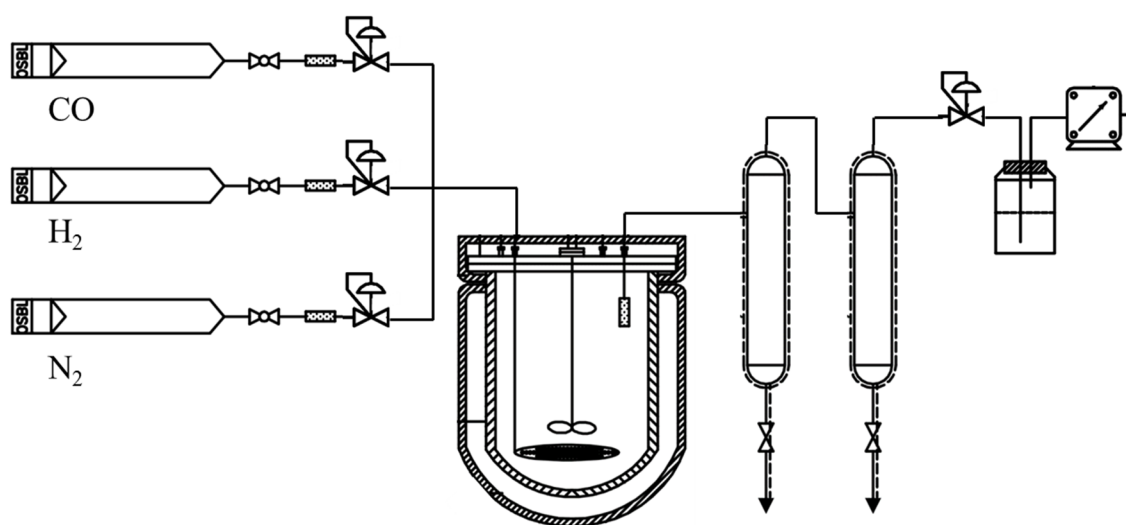


Figure S1 Flow diagram of the 1 L stirred tank reactor.



Figure S2 Picture of the 1 L stirred tank reactor.