



Figure S1. Peak height found with the hTISIS normalized with respect to that measured for the Cyclonic reference spray chamber. (a) Vanadium; (b) iron; (c) aluminum. White bars: hTISIS temperature: 200 °C; grey bars: hTISIS temperature: 400 °C. Samples dilution factor: 1:10

Table S1. Concentrations found for the different samples, elements and sample introduction systems following the dilution and shot ICP-OES method and microwave digestion.

	Cyclonic	hTISIS 200 °C	hTISIS 400 °C	MW digestion
Element: Si				
VD 1:10	2.1	0.7	0.8	0.8
VD 1:5	0.7	0.7	0.8	0.8
VD 1:2	0.6	0.7	0.8	0.8
AR 1:50	3.0	2.0	2.0	2
AR 1:20	1.8	1.9	2.0	2
AR 1:10	1.4	1.9	2.0	2
AR 1:5	1.1	1.8	2.0	2
AR 1:2	1.0	1.7	2.0	2
Crude oil 1:10	1.3	2.3	2.5	2.5
Crude oil 1:5	1.5	2.2	2.5	2.5

Crude oil 1:2	1.1	1.8	2.5	2.5
Fuel 1:10	21.2	32.5	37.2	37
Fuel 1:20	24.9	35.3	37.5	37
Fuel 1:50	30.9	37.6	36.6	37
VR 1:10	3.9	7.4	8.1	8
VR 1:20	6.9	7.5	8.0	8
VR 1:50	7.2	8.1	8.1	8
Element: V				
VD 1:10	1.5	1.1	0.4	0.4
VD 1:5	0.3	0.3	0.4	0.4
VD 1:2	0.3	0.3	0.4	0.4
AR 1:50	48.6	54.0	59.5	58
AR 1:20	44.3	51.7	58.5	58
AR 1:10	40.4	*	*	58
AR 1:5	40.3	*	*	58
AR 1:2	34.2	*	*	58
Crude oil 1:10	0.7	0.6	0.2	0.19
Crude oil 1:5	0.4	0.3	0.2	0.19
Crude oil 1:2	0.2	0.2	0.2	0.19
Fuel 1:10	26.8	*	*	39
Fuel 1:20	30.7	36.2	38.3	39
Fuel 1:50	33.0	37.8	38.3	39
VR 1:10	73.1	*	*	99
VR 1:20	78.1	*	*	99
VR 1:50	83.4	97.2	99.8	99
Element: Fe				
VD 1:10	2.7	2.6	3.0	3
VD 1:5	2.4	2.4	3.0	3
VD 1:2	2.1	2.2	3.0	3
AR 1:50	7.0	7.1	7.1	7
AR 1:20	6.2	6.8	7.0	7
AR 1:10	5.4	6.3	6.9	7
AR 1:5	5.0	6.0	7.0	7
AR 1:2	4.7	5.6	7.0	7
Crude oil 1:10	-0.3	0.4	0.5	0.45
Crude oil 1:5	0.4	0.4	0.4	0.45
Crude oil 1:2	0.3	0.3	0.4	0.45
Fuel 1:10	32.2	41.9	44.1	44
Fuel 1:20	36.3	43.3	44.8	44
Fuel 1:50	39.5	42.8	43.5	44
VR 1:10	34.7	47.8	52.2	53
VR 1:20	44.1	52.6	53.1	53
VR 1:50	47.6	52.5	52.4	53

Element: Al				
VD 1:10	1.5	0.5	0.3	0.3
VD 1:5	0.5	0.3	0.3	0.3
VD 1:2	0.3	0.3	0.3	0.3
AR 1:50	2.0	0.8	0.8	0.8
AR 1:20	0.4	0.7	0.8	0.8
AR 1:10	0.6	0.7	0.8	0.8
AR 1:5	0.6	0.6	0.8	0.8
AR 1:2	0.5	0.6	0.8	0.8
Crude oil 1:10	0.3	0.4	0.2	0.16
Crude oil 1:5	0.3	0.3	0.2	0.16
Crude oil 1:2	0.3	0.2	0.2	0.16
Fuel 1:10	17.9	27.5	30.7	31
Fuel 1:20	23.4	29.4	30.5	31
Fuel 1:50	25.3	29.9	31.2	31
VR 1:10	2.0	2.5	3.0	3
VR 1:20	2.5	2.9	3.0	3
VR 1:50	<0	2.9	3.0	3
Element: Ni				
VD 1:10	<0	0.2	0.3	0.3
VD 1:5	0	0.2	0.3	0.3
VD 1:2	0.2	0.3	0.3	0.3
AR 1:50	15.2	17.9	18.3	18
AR 1:20	14.7	17.3	18.3	18
AR 1:10	13.6	15.0	18.3	18
AR 1:5	13.5	14.2	18.1	18
AR 1:2	10.0	14.5	17.8	18
Crude oil 1:10	1.8	2.2	2.4	2.5
Crude oil 1:5	1.9	2.2	2.5	2.5
Crude oil 1:2	1.5	2.2	2.5	2.5
Fuel 1:10	19.6	22.1	25.2	25
Fuel 1:20	19.6	23.6	24.5	25
Fuel 1:50	21.4	24.4	25.1	25
VR 1:10	19.7	29.8	32.2	32
VR 1:20	23.0	31.4	31.9	32
VR 1:50	22.5	32.5	31.2	32

	<i>Cyclo nic</i>	Dilution factor (DF.)		$DF_{Cyclonic}/DF_{HTIS}$ IS200°C	$DF_{Cyclonic}/DF_{HTIS}$ IS400°C
		<i>hTIS IS 200 °C</i>	<i>hTIS IS 400 °C</i>		
Element: Si					
VD	#	10	2	--	--
AR	20	5	2	4	10
Cru de oil	#	10	2	--	--
Fuel	#	20	10	--	--
VR	50	10	10	5	5
Element: V					
VD	#	#	2	--	--
AR	#	50 ⁺	20*	--	--
Cru de oil	#	2	2	--	--
Fuel	#	20*	20*	--	--
VR	#	50 ^{\$}	50 ^{\$}	--	--
Element: Fe					
VD	10	#	2	--	5
AR	50	10	2	5	25
Cru de oil	5	10	2	0.5	2.5
Fuel	#	10	10	--	--
VR	50	10	10	5	5
Element: Al					
VD	#	5	2	--	--
AR	#	50	2	--	--
Cru de oil	#	#	2	--	--
Fuel	#	20	10	--	--
VR	#	20	10	--	--
Element: Ni					
VD	#	2	2	--	--
AR	#	20	2	--	--
Cru de oil	#	#	2	--	--
Fuel	#	20	10	--	--
VR	#	10	10	--	--

The concentration value is outside the tolerance range

* The signal was saturated for dilution factor lower than 1:10

+ The signal was saturated for dilution factor lower than 1:20

\$ The signal was saturated for dilution factor lower than 1:50

Table S2. Dilution factor for which the difference between the concentration obtained by the dilution and shot ICP-OES method and microwave digestion does not differ by more than 10%.