Applicability of microwave induced plasma optical emission spectrometry for wear metal determination in lubricant oil using a multinebulizer

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Figures

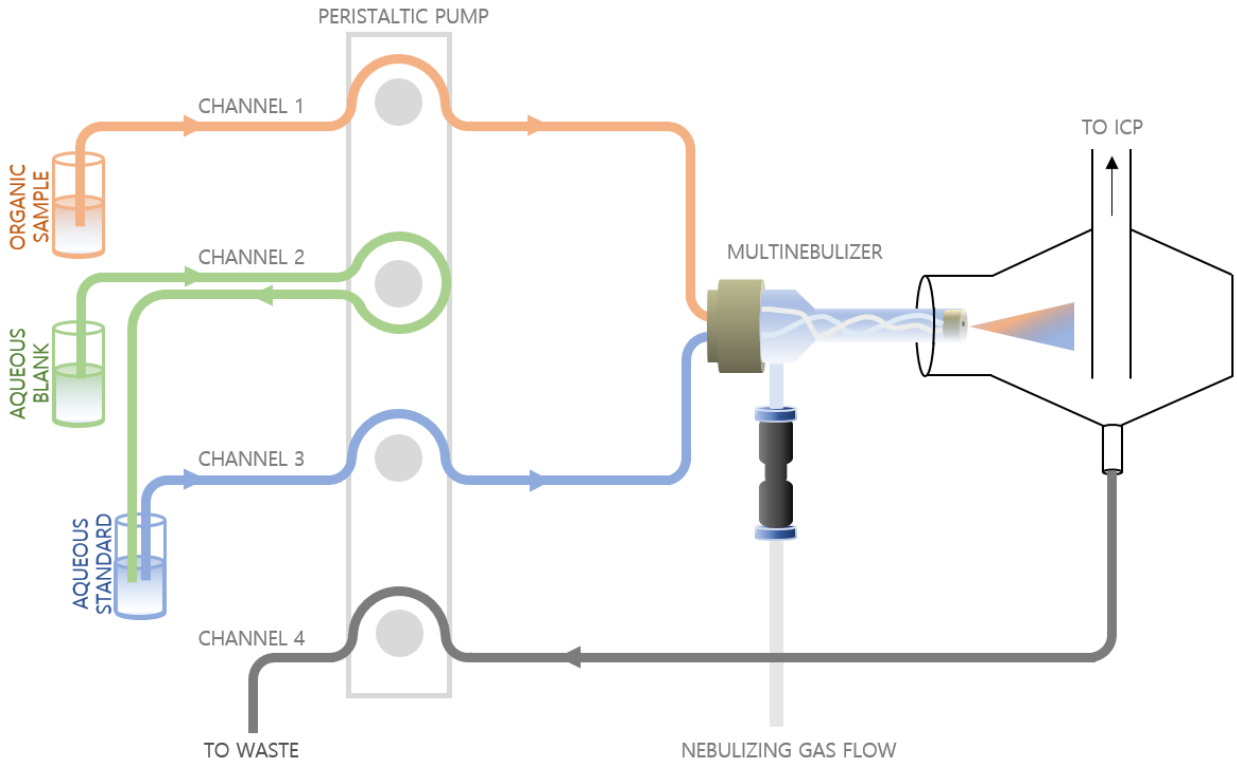

Figure S1. Schematic of experimental setup of the different liquid sample introduction using the multinebulizer (MultiNeb®).

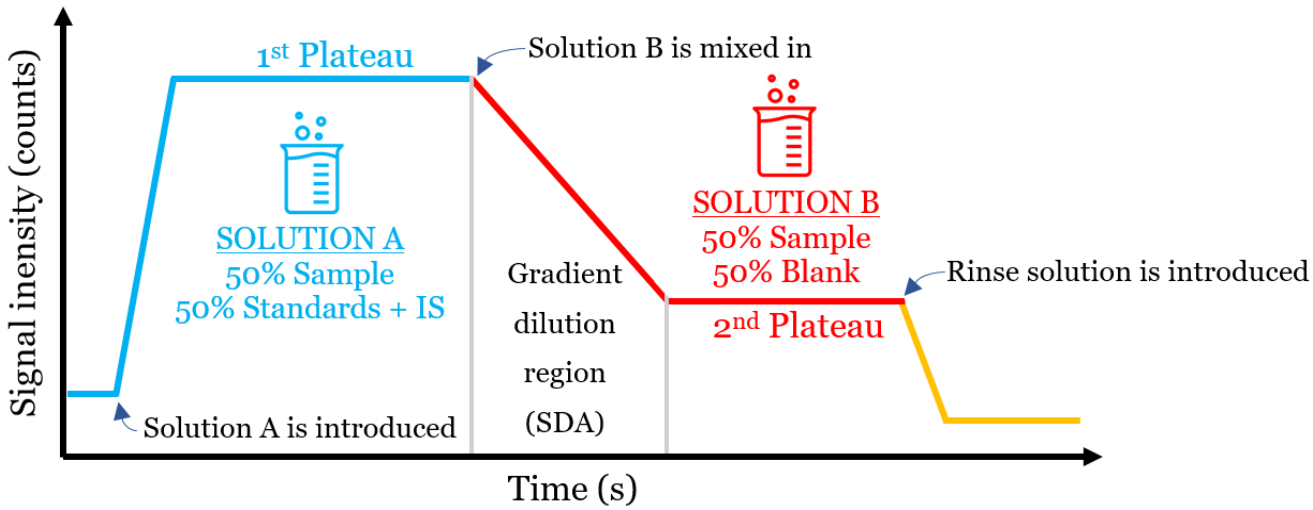

Figure S2. *Signal variation during an SDA analysis.*

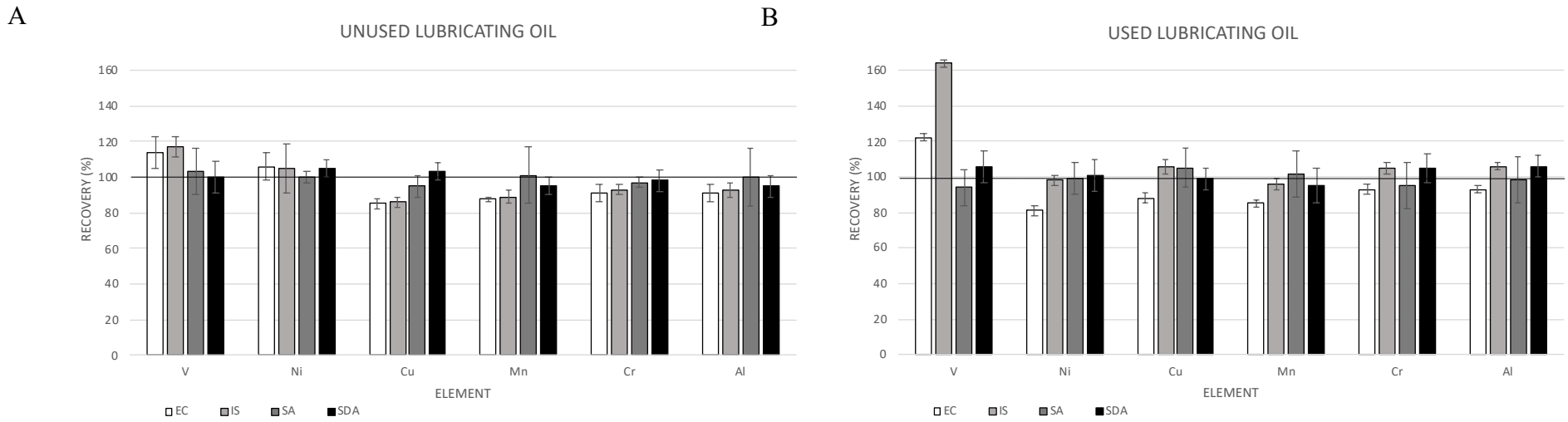

Figure S3. *Percent recoveries (%) for experiments with lubricating oil samples determined by the MP AES using different calibration strategies. A. Unused lubricating oil. B. Used lubricating oil*

Tables

Table S1. *Optimum instrumental parameters used with the MP AES.*

Instrumental parameter	Mode	
	Normal	**Continuous**
Nebulizer gas flow (L min^{-1})	0.7	0.7
Channel 1 liquid flow (mL min^{-1})	0.2	0.2
Channel 2 liquid flow (mL min^{-1})	0.5	0.5
Channel 3 liquid flow (mL min^{-1})	0.5	0.5
Integration time (s)	3	1
Number of replicates	3	1
Plasma observation position	0	0
Background correction	Automatic	Automatic

Table S2. *Emission lines used in this work.*

Element	Emission lines (nm)
Al	396.152
Cr	425.433
Cu	324.754
Mn	403.076
Ni	352.454
V	309.311
Y	371.029

***Table S3**. Critical comparison of the different calibration methodologies evaluated.*

Calibration method	Organic standards	Aqueous standards	Samples[a]	Sample preparation (min)	Analysis (min)	Total time (min)	Sample per hour (h^{-1})
EC	5	1	4	20	20	40	6
IS	5	1	4	20	20	40	6
SA	-	6	4	15	50	65	4
SDA	-	2	4	5	20	25	10

[a] Spiked and non-spiked samples for used and unused lubricating oil.