

Heavy metal speciation in landfill leachate and its association with organic matter

Ngoc NGUYEN THI², Jun NAKAJIMA¹, Masaki TAKAOKA², Hang NGUYEN THI AN¹

¹Vietnam Japan University, VNU-Hanoi, Vietnam, ²Kyoto University, Kyoto city, Japan

Introduction



Existing form of heavy metals in landfill leachate is important. But little is known for leachate in Vietnam.

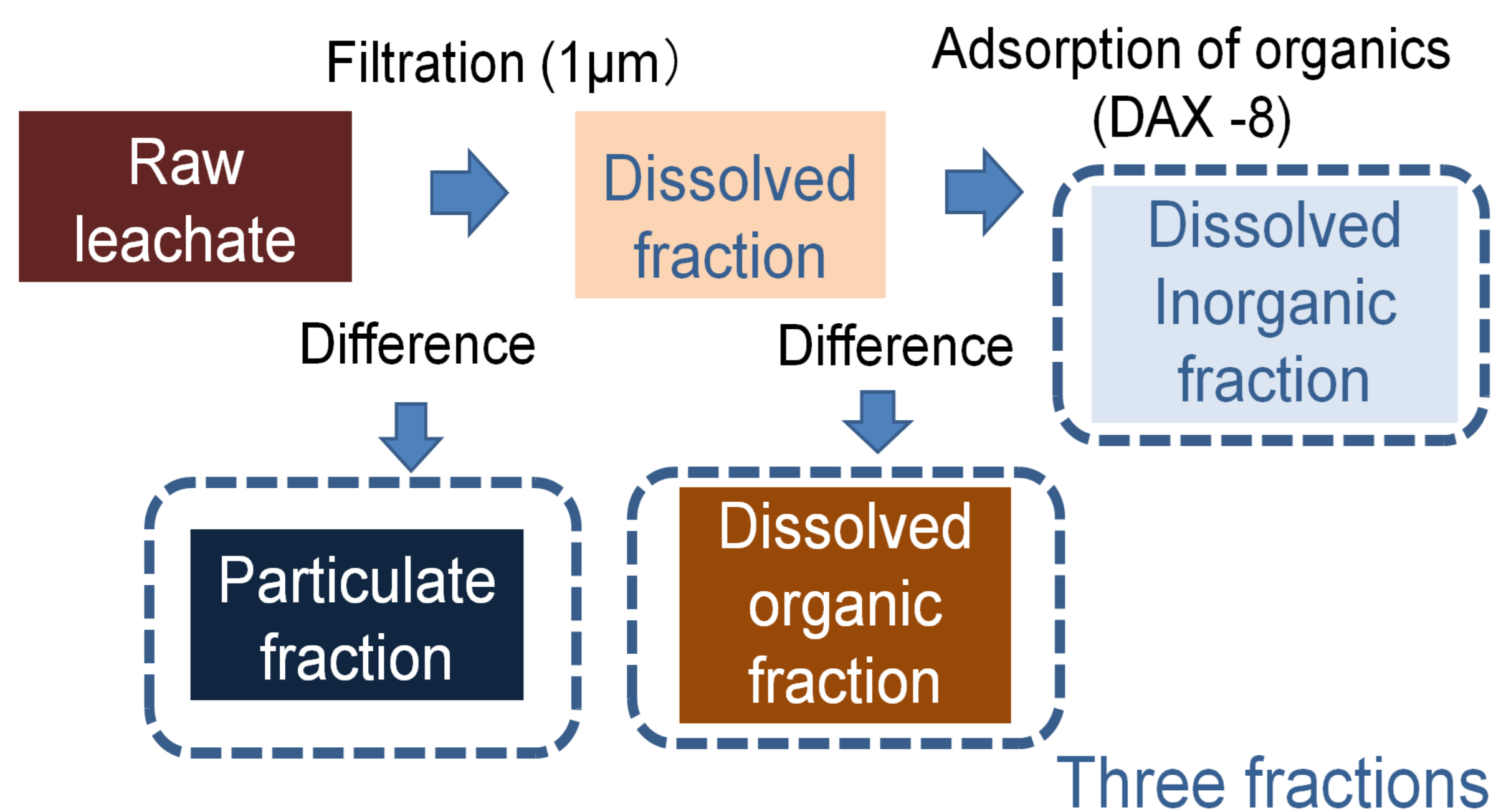
- Preliminary speciation of heavy metal based on different size fractions
- Categories of dissolved organic matter, in which heavy metal exist in.
- Components of the dissolved organic matter by using EEM fluorescence spectroscopy.

Methodology

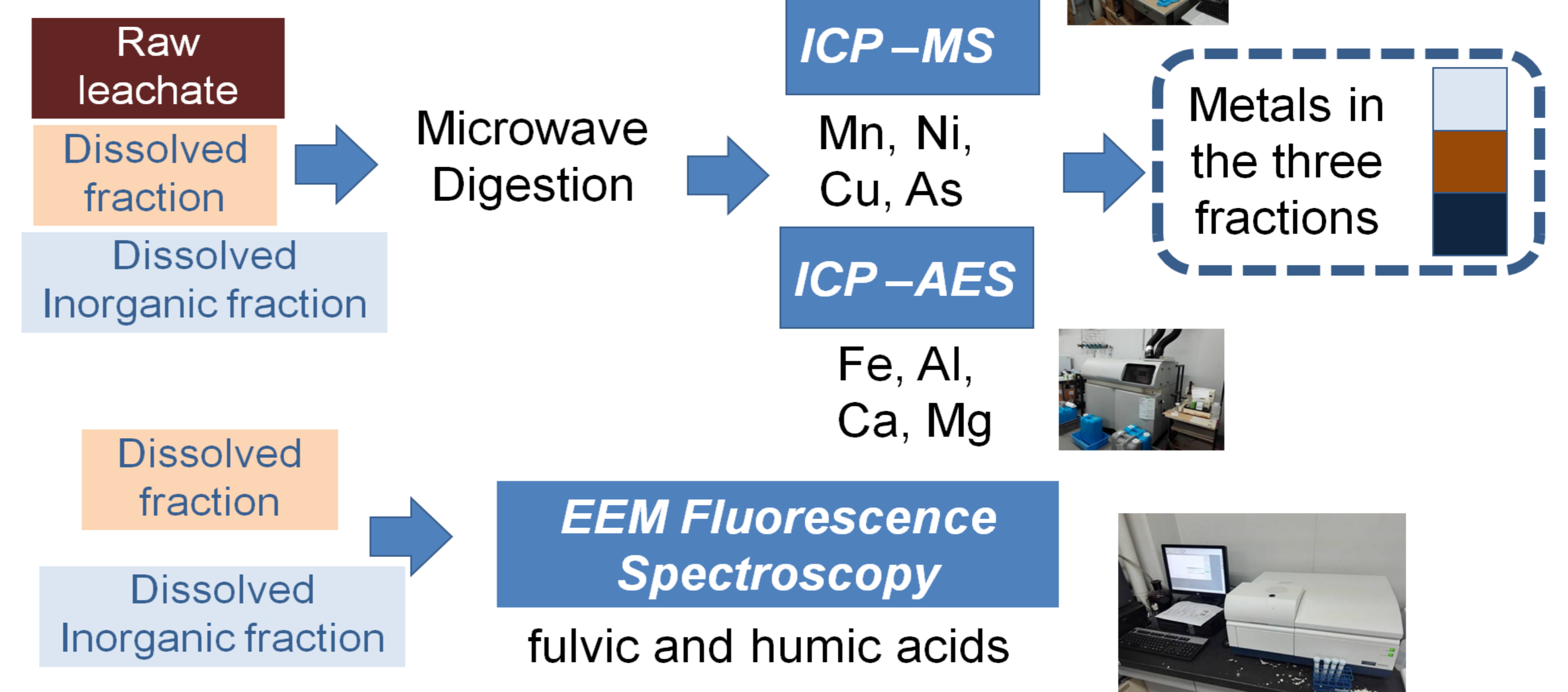
- Nam Son solid waste treatment complex in Soc Son district, Hanoi
- Landfill leachate collection pond
- Sampling 4 times

Sample

Speciation



Analysis and calculation

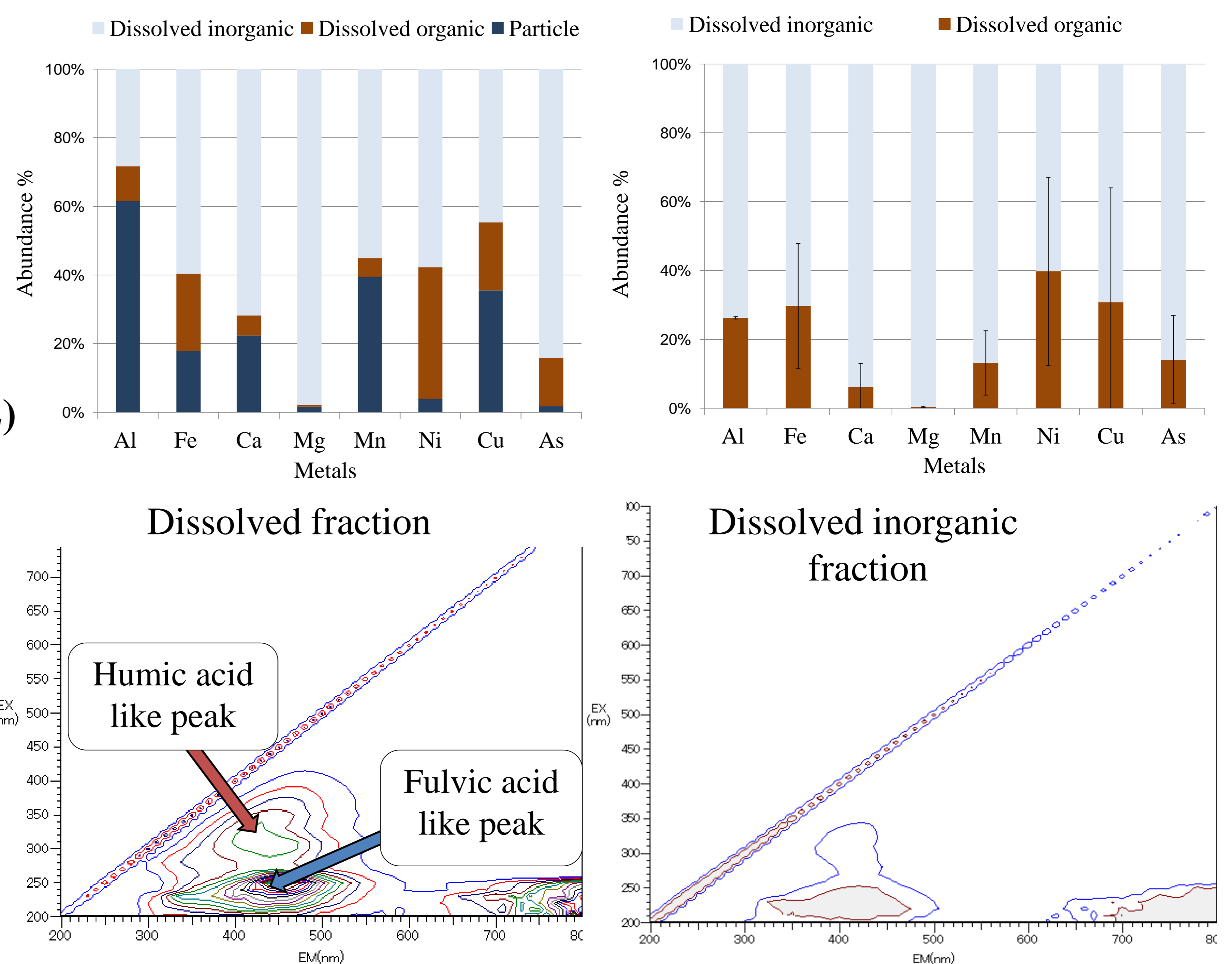


Result and Discussion

- Metals in the leachate were successfully separated to three (particulate, dissolved organic and dissolved inorganic) fractions
- The existence in the particulate, dissolved organic and dissolved inorganic fractions varied significantly among investigated heavy metals
- Mg, Ca (50 - 250 mg/L) and Fe, Al (5 – 12 mg/L) concentrations were high but their existing forms were different .

SP	Al	Fe	Ca	Mg	Mn	Ni	Cu	As
NI-1	2.4	6.8	109	212	0.05	0.15	0.01	0.16
NI-2	3.5	12	52	230	0.12	0.16	0.01	0.15
NI-3	0.6	5.4	265	188	0.01	0.02	0.01	0.02
NI-4	1.2	6.2	123	218	0.01	0.02	0.01	0.03

Metal concentrations of influent leachate samples (mg/L)



- The leachate showed existence of humic substances

Conclusions

- Heavy metals were mainly present in the dissolved inorganic fraction, followed by complexes with humic substances, including humic and fulvic acids.
- A majority of Fe, Cu, Ni, and As formed chelates with humic substances while Al mostly existed in the particulate fraction.
- This finding may be useful for predicting the mobility of heavy metals in the environment as well as effects of humic substance on the landfill leachate treatment.