



Geochemical composition of flowback and produced water

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The huge volumes and unknown composition of flowback and produced waters cause major public concerns about the environmental and social compatibility of hydraulic fracturing and the exploitation of gas from unconventional reservoirs. Flowback and produced waters contain not only residues of fracking additives but also chemical species that are dissolved from the target shales themselves.

Here, samples of base water, slick water were taken before and flowback water were taken after hydraulic fracturing of one horizontal well in Pomeranian region, Poland and investigated for the chemical composition of inorganic and organic compounds. We found that the composition of base and slick water is not reflected in the flowback water. For dissolved organic compounds, it was revealed that the total number of identified organic compounds is quite low in the slick water sample (468 peaks), but is much lower in the flowback water sampled on 6th day of flowback recovery (229 peaks) and is higher in the flowback sampled on 13th day of flowback recovery (982 peaks). It is interesting to note that 60 % of the slick water organic compounds are unique and not present in the early or late flowback water samples. In contrast, in the early flowback only 1.7 % of the compounds are unique and in the late flowback 66.8 % of the compounds are unique. This indicates that on the one hand only 40 % of the injected compounds in the slick water are coming back to the surface in the investigated flowback within the first 2 weeks and on the other hand about 2/3 of the compounds in the late flowback are not present in the slick water but seem to be derived from the shale system, formation water or transformation of the injected slick water compounds.