

**STUDY OF DISSOLVED GASSES IN GROUNDWATER
USING HYDRAULIC PISTON PUMP**

**STUDIUM ROZPUŠTĚNÝCH PLYNŮ V PODZEMNÍCH VODÁCH
POMOCÍ PÍSTOVÉHO HYDRAULICKÉHO ČERPADLA**

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Abstract:

An experimental study of gases dissolved in groundwater was performed in 2012 during the research of innovative remediation methods at uranium mine Stráž.

Water from sandstone aquifer was pumped by conventional submersible pump and newly developed hydraulic piston pump. This type of pump was previously used for zonal sampling of groundwater and recently it was used also for sampling of dissolved gases. Dissolved gasses are abundant in acid mine groundwater at Stráž mine locality. Examined water released dissolved gas in the form of bubbles during pumping water from the aquifer to surface. The gas was captured in glass sample tubes and subsequently it was analysed.

The results indicate that the mixtures of dissolved gases in groundwater are completely different from Earth's atmosphere. The main component is nitrogen. Its content is more than 78.1 vol. %. The second most abundant gas in the samples is oxygen with variable concentrations between 0.33 and 16.7 vol. %. The reduced concentration of O₂ was expected; however, in some cases oxygen concentration is still very high. Rare hydrogen was detected in concentration up to 6.7 vol. % in extreme case. Common concentration of hydrogen in atmosphere is only 0.000055 vol. %. Its' abundant presence in tested groundwater indicates human induced chemical reactions during uranium extraction and subsequent remediation of the locality. The concentration of carbon dioxide was observed in the range of 0.04 to 9.2 vol. %. Nonreactive argon was detected at similar concentrations as it occurs in atmosphere (0.76 to 1.27 vol. %). The traces of light hydrocarbons C1-C3, especially methane, were recorded in examined samples

Keywords:

Gas sampling, composition of dissolved gasses, hydraulic piston pump, Stráž uranium mine