

华东某市老城区潜层地下水硝酸盐分布特征

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摘要: 为了解华东某市老城区潜层地下水硝酸盐分布特征, 对老城区地下水现场采样, 运用统计学软件 spss 中的 Pearson 相关系数和 sufer 软件 Kriging 插值方法分析数据, 研究了无机氮与地球化学因素间的相关性, 同时绘制了 pH 值、总硬度、硝酸盐、亚硝酸盐的空间分布图。结果表明, 硝酸盐是该地区地下水中无机氮的主要存在形态, 其所占总氮含量为 45.5% ~ 74.8%, 封口井的硝酸盐的含量明显低于敞口井的含量, 其硝酸盐所占比例最低达到 2.2%, 且敞口井均受到污染; 从相关性的角度来看, 氮的转化受到 Fe 影响较弱。同时氮的形态与 pH 值、矿化度 (TDS)、电导率 (EC) 等地球化学因素相关水平显著; 从分布特征来看, 地下水环境中硝酸盐和亚硝酸盐含量东北部高于西南部; 不同形态氮的相互转化影响地下水 pH 值和总硬度, 致使 pH 值的高值区为西南部, 而总硬度高值区为东北部。

关键词: 地下水; 硝酸盐; 亚硝酸盐; 相关性分析; 分布特征; 华东某市老城区

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Nitrate Distribution Characteristics of Shallow Groundwater in an Old City of East China

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Abstract: In order to understand the nitrate distribution characteristics of shallow groundwater in an old city of east China, the spatial variation analysis for nitrate (NO_3^-) and nitrite (NO_2^-) content of groundwater samples was studied. The Pearson correlation coefficient and Kriging which were both statistical analysis methods were used to investigated the correlation between inorganic nitrogen and geochemical factors. The spatial distribution maps of pH value, total hardness, nitrate and nitrite were charted simultaneously. The results indicated that nitrate nitrogen of this area was the main form of inorganic nitrogen in groundwater, and the content of NO_3^- ranged from 45.5% to 74.8%. The content of NO_3^- in sealing wells was obviously lower than in opening wells, which was as low as 2.2%. The opening wells were all polluted. According to the correlation, the effect of iron ions on nitrogen transformation was relatively insignificant. The other influence factors, including pH value, total dissolved solids (TDS) and electrical conductivity (EC), provided strong correlation with inorganic nitrogen in the groundwater. From distribution characteristics, the concentrations of nitrate nitrogen and nitrite nitrogen in the northeast area were higher than in the southwest area, which was increased gradually. The nitrogen transformation between different forms affected the pH value and total hardness of groundwater. The high values of pH and total hardness appeared in the southwest area and the northeast area, respectively.

Key words: Groundwater; Nitrate; Nitrite; Correlation analysis; Distribution; Old city of east China

当前,地下水已经成为我国城镇与乡村工农业及生活用水的重要水源。随着人口不断增长,经济迅速发展与城市化进程的加快,地下水开采规模日益扩大,而工业生产过程中产生的污染物通过各种途径渗入土-水环境,恶化地下水水质。研究表明,硝酸盐是进入地下水中最频繁的污染物质^[1]。

我国硝酸盐污染地下水的现状不容乐观,长江

三角洲地区地下水硝酸盐污染已经比较严重,特别是城市中心的老城区,由于其下水管道设施落后,导致其污水污染地下水严重。同时在此区域的地下水方面的研究也少于北方,主要是因为地表水网

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