

祁莹莹,毕春娟,陈振楼,娄焕杰,王骏,李杨杰.温州城市不同下垫面径流中无机氮的含量及初期冲刷效应[J].环境科学学报,2012,32(12):2986-2997

温州城市不同下垫面径流中无机氮的含量及初期冲刷效应

### The content and first flush effect of inorganic nitrogen in different urban runoffs of Wenzhou City

关键词: [无机氮](#) [城市降雨径流](#) [场次降雨污染物平均浓度\(EMC\)](#) [初期冲刷效应\(FFE\)](#)

基金项目: [国家水体污染控制与治理科技重大专项\(No. 2009ZX07317-006\)](#); [国家自然科学基金\(No. 40971259\)](#); [上海市优秀学科带头人计划\(No. 10XD1401600\)](#); [上海市科委基础研究重点项目\(No. 10JC1404300\)](#)

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摘要: 在温州两个采样区分别监测了4场降雨事件,选取交通干道、停车场、小区屋面、小区路面、城市排水系统汇流口、草地等6种下垫面,测定地表降雨径流中溶解铵态氮( $\text{NH}_4^+\text{-N}$ )、溶解硝态氮( $\text{NO}_3^-\text{-N}$ )、溶解亚硝态氮( $\text{NO}_2^-\text{-N}$ )的含量及基本理化指标.结果表明,温州城市降雨径流中 $\text{NH}_4^+\text{-N}$ 、 $\text{NO}_3^-\text{-N}$ 和 $\text{NO}_2^-\text{-N}$ 的降雨事件平均浓度(EMC)值分别介于0.40~5.55、0.01~4.70、0~0.87  $\text{mg} \cdot \text{L}^{-1}$ (以N计)之间,九山外河区域氮污染比山下河区域严重,交通干道、居民生活区是氮污染严重的地方,应加以重视.多数下垫面径流中溶解态无机氮以 $\text{NH}_4^+\text{-N}$ 为主,比例可达50%以上,九山外河区域各下垫面径流中 $\text{NH}_4^+\text{-N}$ 普遍超过了地表水环境V类水标准.除小区路面以外,各下垫面径流多次出现 $\text{NH}_4^+\text{-N}$ 的初期冲刷效应,仅小区屋面和汇流口径流中出现过 $\text{NO}_3^-\text{-N}$ 初期冲刷效应.

**Abstract:** The purpose of this study is to investigate the characteristics of dissolved inorganic nitrogen in storm runoff and the first flush effect in urban areas. Six land use locations, including urban traffic road, parking lot, roof and road in residential lot, lawn and sewer outlet, in two watersheds in the city of Wenzhou were selected for sampling and studied during four storm events. Quality parameters such as ammonium ( $\text{NH}_4^+\text{-N}$ ), nitrate ( $\text{NO}_3^-\text{-N}$ ), nitrite ( $\text{NO}_2^-\text{-N}$ ) and physicochemical indexes of storm runoff water were analyzed. The results showed that event mean concentrations (EMC) of  $\text{NH}_4^+\text{-N}$ ,  $\text{NO}_3^-\text{-N}$  and  $\text{NO}_2^-\text{-N}$  ranged from 0.40 to 5.55, from 0.01 to 4.70 and from 0 to 0.87  $\text{mg} \cdot \text{L}^{-1}$ , respectively. The nitrogen concentrations in Jiushanwai watershed were higher than Shanxia watershed, and there was heavy nitrogen pollution at urban traffic road and residential lot.  $\text{NH}_4^+\text{-N}$  dominated dissolved inorganic nitrogen in most runoffs, with percentages higher than 50%.  $\text{NH}_4^+\text{-N}$  levels were higher than the fifth grade value of national surface water quality standards in samples from Jiushanwai watershed. The first flush effect of  $\text{NH}_4^+\text{-N}$  appeared to occur more frequently at sampling locations except for road in residential lot, while the first flush effect of  $\text{NO}_3^-\text{-N}$  only appeared at roof of residential lot and sewer outlet occasionally.

**Key words:** [inorganic nitrogen](#) [urban runoff](#) [event mean concentrations \(EMC\)](#) [first flush effect \(FFE\)](#)

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