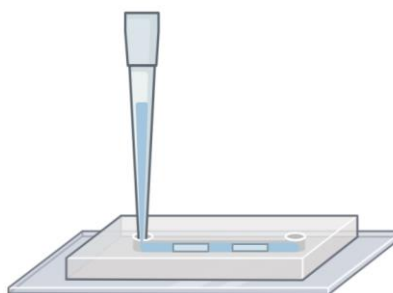


## Master's Thesis project

### Rapid-test for the determination of chloride in concrete samples

**Background:** Concrete corrosion poses a significant problem for numerous public infrastructure, including road and railway bridges. This phenomenon can potentially result in structural damage to the buildings concerned and consequential catastrophic outcomes. A recent example of this phenomenon is the 2024 collapse of the tram bridge at the Carola-bridge in Dresden. Investigations revealed that the primary cause of this disaster was the ingress of chloride ions into the steel-reinforced concrete, in conjunction with the process of carbonation. The ingress of chlorides into concrete structures initiate an irreversible corrosion process of the steel reinforcement. To mitigate the risk of such incidents, routine inspections of public buildings are conducted using a combination of chemical and physical methods. Conventional titration, following digestion with nitric acid, is the standard method for determination of chloride in concrete samples. Consequently, samples are collected on-site and transferred to the designated laboratory for analysis.



**Objective:** The main goal of this project is to conduct a field test for chloride in drill dust samples. The rapid test is based on a lab-on-paper or lab-on-chip approach, which integrates sample preparation (filtering and neutralisation), reaction and detection units. This approach will enable a rapid determination of chloride contamination in the field.

**Tasks:** - Synthesis of fluorescent indicators - Immobilisation dyes in polymer or paper matrix - Preparation of lab-on-chips with added manufacturing (3D-printing) – Integration of sample preparation - Development of analytic procedure – Testing with real sample – Validation with standard titration method

**Requirements:** Bachelor's in Chemistry, Biomedical Engineering, Geo Sciences, Environmental Systems Sciences

**Start of the work:** As soon as possible

**Duration of practical work:** 6 months

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