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CHANGES IN pH OF CONCRETE DURING HYDRATION

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The pH value plays a major role in the concrete structure and its reinforcement. The corrosion of the concrete structure begins when its pH value falls below a specific level. Many studies have been performed to investigate the environmental factors that affect the pH of concrete. However, limited studies have been carried out on the pH changes in the concrete pore solution for some time. The present study investigates the pH changes of pore solution in the concrete during the hydration reaction up to three months. There is no standard procedure to measure the pH of cementitious structures. In this work, various analytical methods have been used, and the results were compared to find a correct way to measure the pH of concrete. Furthermore, the pH change pattern during the hydration reaction with time was also studied. Ex-situ leaching method with cold water extract methodology was used to extract the concrete pore solution. Various methods, including titration, direct measurement using a pH meter, reverse calculation, and thermodynamic modelling methods, were used to determine the pH of the extracted solutions. Due to the dilution effect of the added water, the methods used for measuring the pH value of the pore solution, such as direct pH measurement with a pH meter and titration method, underestimated the actual pH level. Moreover, both the reverse calculation of ionic activity of H^+ in the concrete pore solution using titration method and the pH measurement using a pH meter cannot represent the actual ionic activity of H^+ ion. However, the results obtained by modelling from the measured alkali concentrations showed acceptable results. This research outcome shows that the pH is increased nearly by 5% after a month of hydration of the concrete.

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