CARBONATION TEST

1. Objective: Carbonation of concrete is a process by which Carbon di Oxide from the air penetrates into the concrete and reacts with calcium hydro-oxide to form calcium carbonates. Conversion of $Ca(OH)_2$ into $CaCO_3$ by action of CO_2 by itself is not reactive. In the presence of moisture, CO_2 changes into dilute carbonic acid which attacks the reinforcement and also reduces alkalinity of concrete. In this test Phenolphthalein solution is used as indicator.

2. Application: Carbonation of concrete is one of the main reasons for corrosion of reinforcement. Oxygen and moisture are the other components required for corrosion of embedded steel. In this test, the depth of carbonation is determined. The rate of carbonation depends on the grade of concrete, permeability of concrete, whether the concrete is protected or not, depth of cover, time, etc.

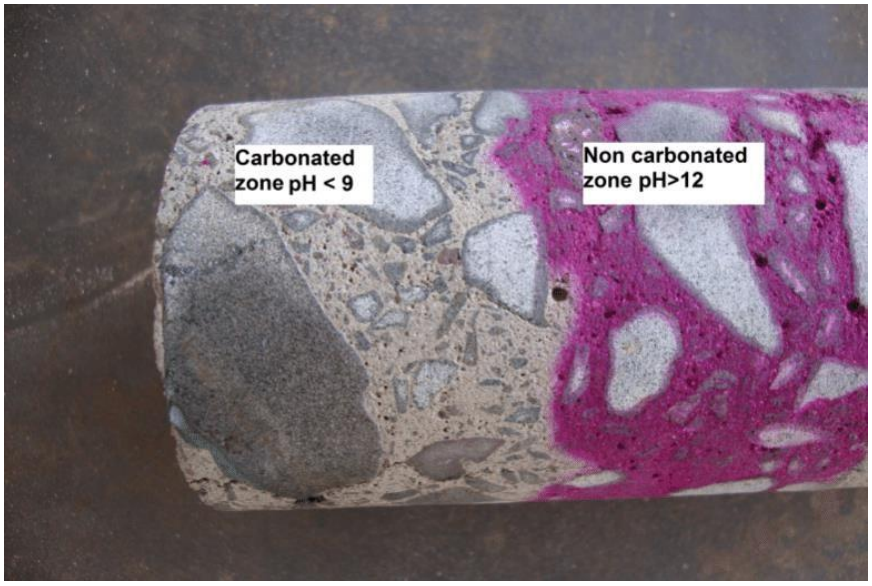

Fig. 1: Carbonation Test on Concrete

3. Procedure:

1. This test is most commonly carried out by spraying the indicator on freshly exposed surfaces of concrete broken from the structure.
2. Carbonation depth is accessed by using a solution of phenolphthalein indicator that appears pink in contact with alkaline concrete with pH value in excess of 9 when the concrete is not carbonized.
3. Colourless at lower levels of pH value when concrete is carbonated and the protective layer gets destroyed and the steel is exposed to corrosion.