

Concrete Durability

Chamber room with ovens, furnaces and carbonation chamber



Many ovens are available to ensure the requirement of maintaining the temperature (50°C, 100°C etc.) for continuous days for simultaneously working scholars. The requirement include

- Sample drying at 50°C for 7 days before OPI test.
- Water absorption determination by drying samples at 100°C till constant weight

Numerous Furnaces are utilized in aggregate and clinker synthesis research.

Carbonation chamber

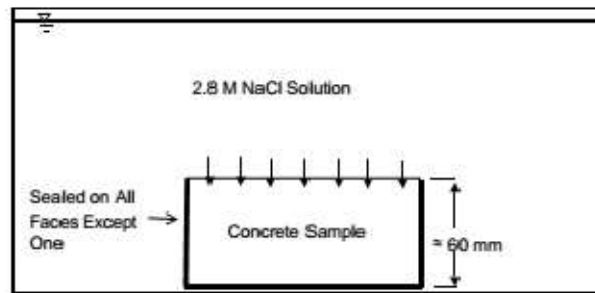
Carbonation chambers are employed for accelerated carbonation study.

- Measuring the depth of carbonation at different sections of the prismatic samples at different time intervals (70,98, 112 and 154 days)
- Phenolphthalein used as indicator – colourless implies carbonated



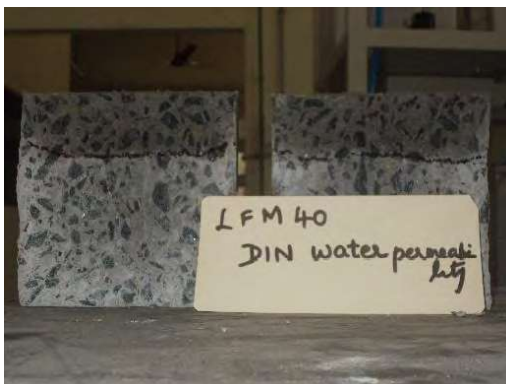
(a) Carbonation chamber (b) phenolphthalein sprayed over concrete samples taken from carbonation chamber- the pink colour indicates the uncarbonated core and the carbonated region is characterized by colourless region. Carbonation depth can be measured from this.

Bulk diffusion test



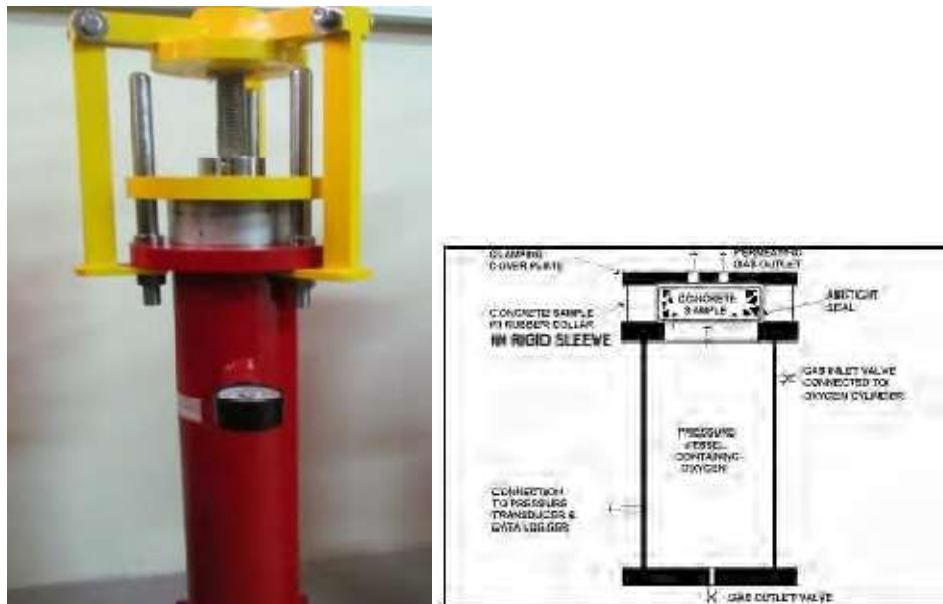
- Natural diffusion under a very high concentration gradient
- Specimens saturated with saturated lime water are immersed in 16.5% NaCl solution for 35 days
- Uni-directional diffusion
- Chloride profiling with profile grinder
- Chloride ion concentration determined

Water Permeability Test (DIN 1048 part 5)

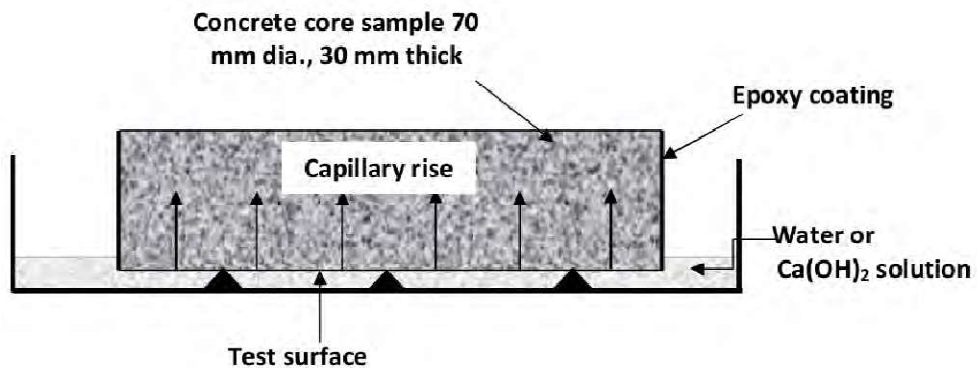


- Measure of the resistance of concrete against the penetration of water exerting pressure.
- Age of concrete is between 28 and 35 days
- A water pressure of 0.5 N/mm² is applied for a period of 3 days
- After the pressure is released, the specimen is split into two and the depth of water penetration is noted

Oxygen Permeability Test (DI Manual, SA)



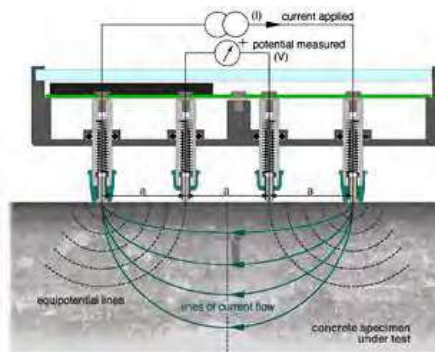
Sorptivity Test (DI Manual, SA)



- Measures the rate of movement of a water front through the concrete under capillary suction



Wenner 4 Probe Resistivity Test



- Not truly a migration test
- Consists of four probes
- Through two outer probes current is applied while the inner two probes measure the potential

Shrinkage lab with controlled environment (25°C, RH 65 %)



Centralised AC for controlling the temperature and humidity of the labs



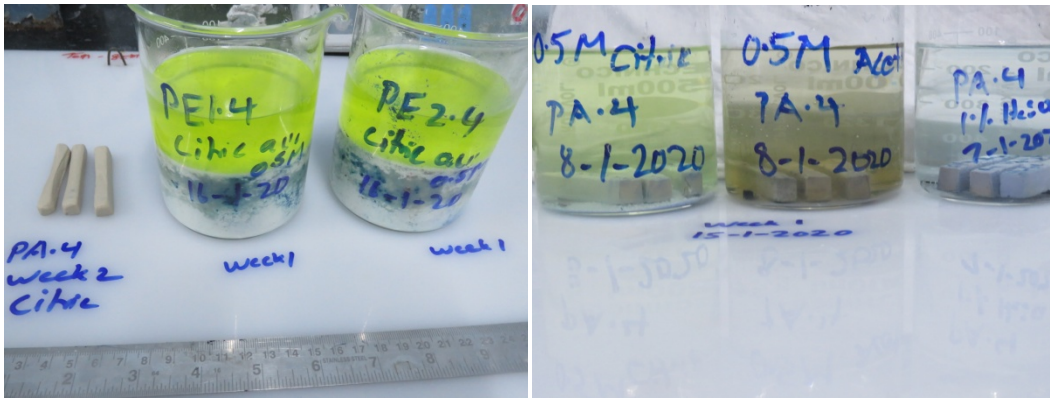
(a) and (b) Durability lab, (c) storage of specimens

Acid attack study



For accelerated degradation.
Simulate the effect of flowing effluents

Apparatus for dynamic testing of acid attack



Special cement specimens immersed in various acids



Eutech pH 5+ pH meter



Digital caliper used for measuring the dimension change



Pundit lab instrument for measuring ultrasonic pulse velocity – can be used in studying the property change after acid attack



Diamond tipped saw used in the study to cut thin slices of samples



The samples for powder XRD are prepared by crushing in Mortar and pestle and sieved through 75 μm /
40 μm sieve



The samples for characterization are stored in desiccator after creation of vacuum using a pump