

HOMEWORK

- 1) What do you understand by the term durability? Compared to other considerations, how much importance should be given to durability in the design and construction of concrete structures?
- 2) How would you define the coefficient of permeability? Give typical values of the coefficient for (a) fresh cement pastes; (b) hardened cement pastes; (c) commonly used aggregates; (d) high-strength concretes; and (e) mass concrete for dams.
- 3) How does aggregate size influence the coefficient of permeability of concrete? List other factors that determine the permeability of concrete in a structure.
- 4) With respect to frost damage, what do you understand by the term critical aggregate size? What factors govern it?
- 5) Discuss the factors that influence the compressive strength of concrete exposed to a fire of medium intensity (650 C, short-duration exposure). Compared to the compressive strength, how would the elastic modulus be affected, and why?
- 6) List some of the common sources of sulfate ions in natural and industrial environments. For a given sulfate concentration, explain which of the following solutions would be the most deleterious and which would be the least deleterious to a permeable concrete containing a high-C3A portland cement: Na_2SO_4 , MgSO_4 , CaSO_4 .
- 7) What chemical reactions are generally involved in sulfate attack on concrete? What are the physical manifestations of these reactions?
- 8) What is the alkali-aggregate reaction? List some of the rock types that are vulnerable to attack by alkaline solutions. Discuss the effect of aggregate size on the phenomenon.
- 9) With respect to the corrosion of steel in concrete, explain the significance of the following terms: carbonation of concrete, passivity of steel, electrical resistivity of concrete, state of oxidation of iron.
- 10) Briefly describe the measures that should be considered for the control of corrosion of embedded steel in concrete.