Types of Corrosion Inhibitors

- Anodic (nitrites & chromates)
  - affect the anodic kinetics, shift the corrosion potential to more noble values and reduce the corrosion current.
  - Anodic inhibitors form protective films on anodic surfaces by stopping the formation of ferrous iron. If used alone, large doses are required because an insufficient quantity of inhibitor will fail to treat all of the anodic sites and pitting corrosion may occur due to the high cathode to anode ratio (Fadayomi, 1997).
  - The most widely used anodic inhibitor used in the United States is calcium nitrite (Emmons, 1997).

Types of Corrosion Inhibitors

- Cathodic (arsenates)
  - shift the potential to less noble values and reduce the corrosion current.
  - Cathodic inhibitors form a protective film on alkaline cathodic surfaces through the production of a compound that is insoluble at high pH levels. The cathodic reaction in the presence of oxygen is thereby prevented.

Types of Corrosion Inhibitors

- Mixed (amines)
  - affect both the anodic and cathodic reactions and shift the corrosion potential in the direction determined by the predominant reaction.
  - Dosages of this type of inhibitor may be greatly reduced since the combined effect is greater than the sum of their individual effect.
  - Organic inhibitors are a subgroup of the combined inhibitor. They utilize compounds that form a monomolecular film between the metal and the water. These compounds are polar and have a strong affinity for surfaces onto which they may be adsorbed (Darling, 1998).

MCI Inhibitor Protection

- E_0 = Control corrosion rate potential (intersection of anodic and cathodic curves)
- E_1 = Anodic corrosion inhibitor corrosion rate potential (shifts anodic curve)
- E_2 = Cathodic corrosion inhibitor corrosion rate potential (shifts cathodic curve)
- E_3 = Mixed corrosion inhibitor corrosion rate potential (shifts both anodic & cathodic curves)

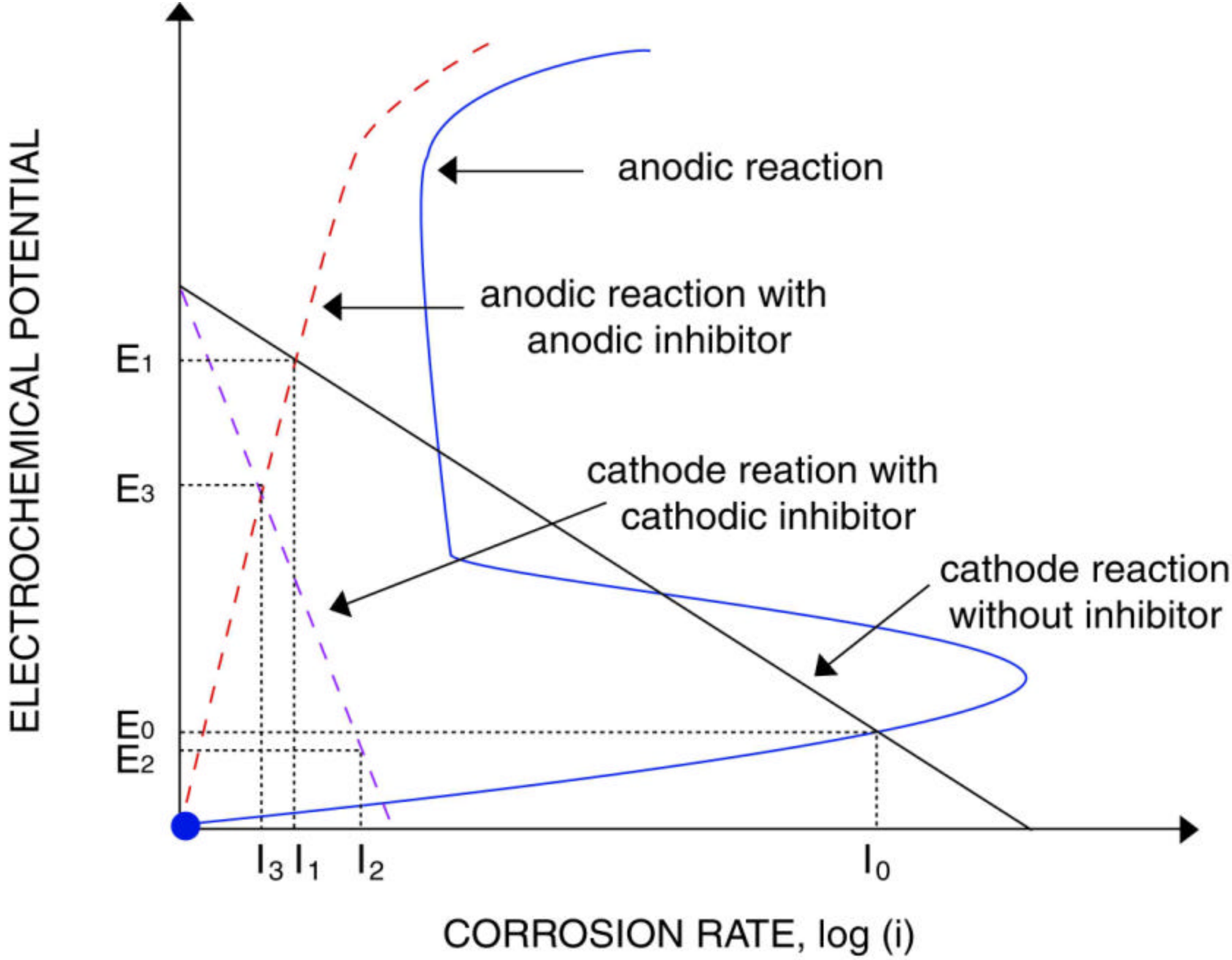

Fig. 1: The effect of inhibitors on corrosion potential and corrosion current density