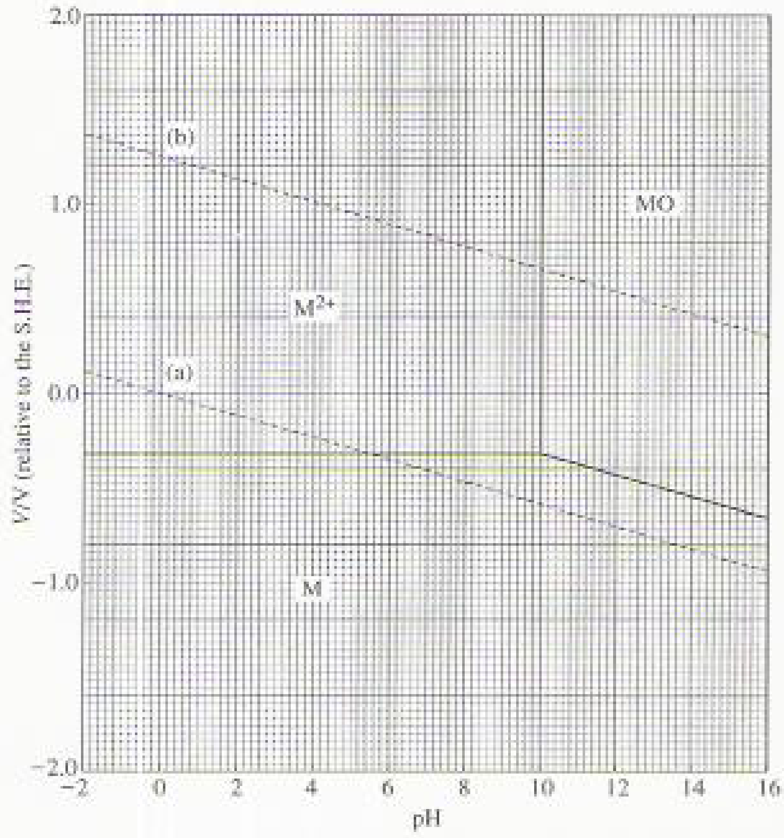

Figure 6.7 The Pourbaix diagram for metal M at 298.15 K, with the electrode potentials for (a) reduction of H^+ ions (equation 6.16) and (b) reduction of oxygen (equation 6.17) superimposed as dashed lines.

Q6.45 With reference to the Evans diagram in Figure 6.8, select from the key *three* **correct** statements.

KEY for Q6.45

A Under the conditions in Figure 6.8, the exchange current density for oxygen reduction on a surface composed of metal M is approximately 10^{-8} A m^{-2}.

B Under the conditions in Figure 6.8, the transfer coefficient for oxygen reduction on a surface composed of metal M has the value $\alpha_{\text{red,ca}} = 1.5$.

C In constructing the Evans diagram in Figure 6.8, it has been assumed that the equilibrium potential difference for the metal anodic reaction, $\Delta\phi_{\text{e,an}}$, can be set equal to the standard electrode potential of the (M^{2+}|M) couple, $E^{\ominus}(M^{2+}|M)$.

D According to Figure 6.8, in an unagitated solution at pH = 0, the H^+ ion reduction reaction will be the predominant cathodic process.

E According to Figure 6.8, the oxygen reduction reaction will be the predominant cathodic process in both agitated and unagitated solutions at pH = 0.

F According to Figure 6.8, in an unagitated solution at pH = 0, the corrosion current density would be approximately 10^{-5} A m^{-2}.

G In both agitated and unagitated solutions at pH = 0, the corrosion potential predicted on the basis of the Evans diagram in Figure 6.8 lies within the 'corrosion' region of the Pourbaix diagram in Figure 6.7.

H The Evans diagram in Figure 6.8 suggests that copper metal could be used to provide sacrificial protection to metal M at pH = 0.

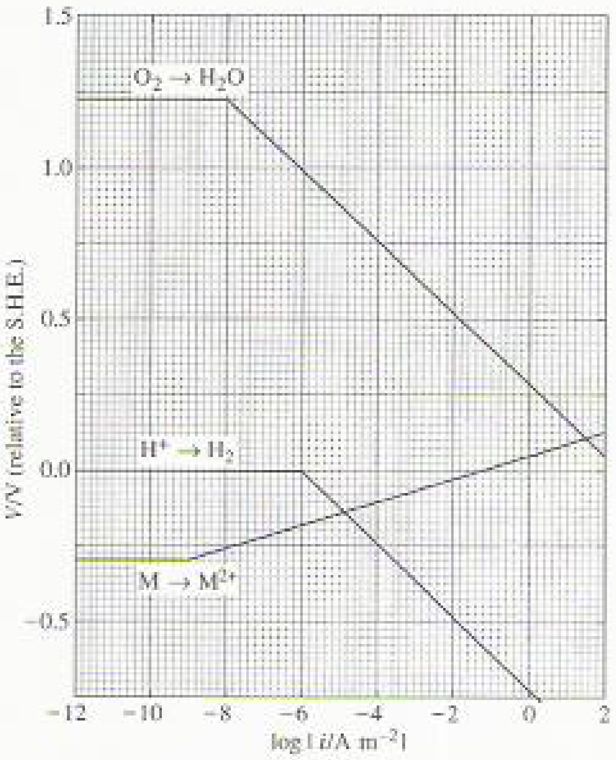

Figure 6.8 The Evans diagram for metal M at pH = 0 and 298.15 K, including both possible cathodic processes.