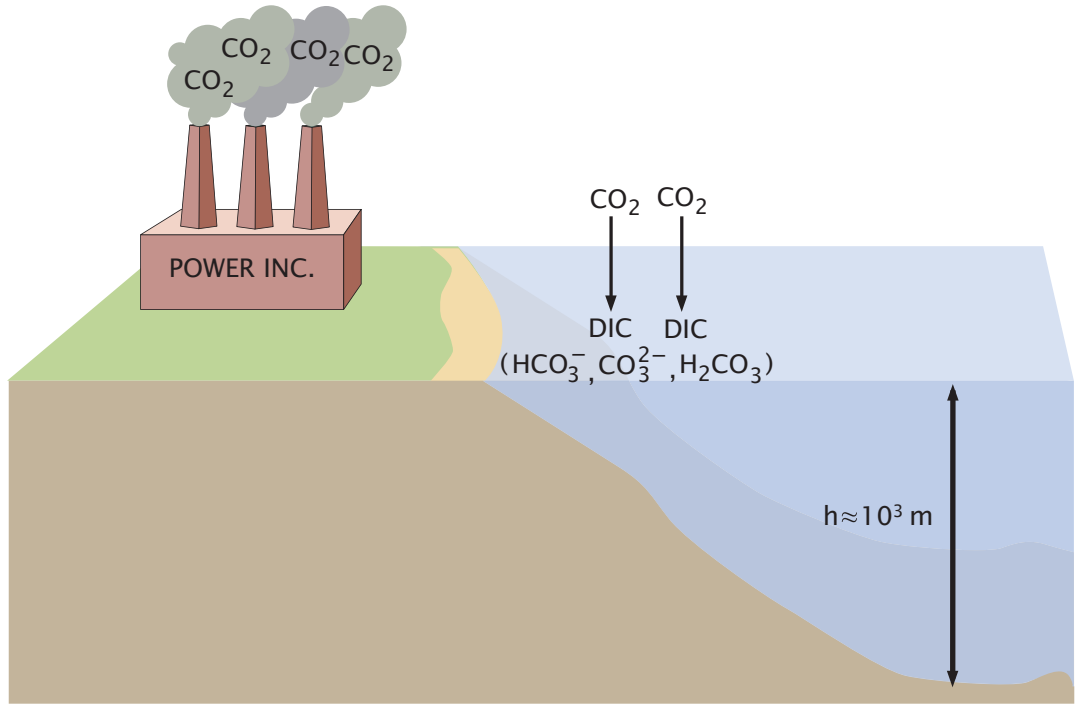
ESTIMATING OCEANIC CO_2 UPTAKE

(A)



(B)

$$\Delta\,DIC_{surface} \approx \frac{\Delta\,[CO_2]_{atmosphere}}{[CO_2]_{atmosphere}} \times \frac{DIC_{surface}}{R}$$

$$\approx \frac{2\ ppm\ /\ yr}{420\ ppm} \times \frac{2 \times 10^{-5}\,kg\ C}{10\ kg\ H_2O}$$

$$\approx 10^{-8}\,kg\ C/(kg\ H_2O \times yr)$$

$$h_{ocean} \approx 10^3\,m$$

$$A_{ocean} \approx f \times 10^{14}\,m^2$$

$$\rho_{water} \approx 10^3\,kg\ /\ m^3\,H_2O$$

$$\Delta\,C_{ocean} \approx \Delta\,DIC_{surface} \times h_{ocean} \times A_{ocean} \times \rho_{water}$$

$$\approx \frac{10^{-8}\,kg\ C}{kg\ H_2O\ /\ yr} \times 10^3\,m \times f \times 10^{14}\,m^2 \times \frac{10^3\,kg}{m^3\,H_2O}$$

$$\approx f \times 10^{12}\,kg\ C\ /\ yr$$

$$m_{CO_2} \approx f\ kg\ CO_2\ /\ kg\ CO$$

$$\Delta\,CO_{2\,ocean} \approx f \times 10^{12}\,kg\ C\ /\ yr \times f\ kg\ CO_2\ /\ kg\ CO$$

$$\approx 10^{13}\,kg\ CO_2\ /\ yr$$

(C)