

CO₂ EFFECTS ON MARINE PHYTOPLANKTON:
INHIBITION OF PHOTOSYNTHETIC PROCESSES

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by

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ABSTRACT

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It is shown here that carbon dioxide gas has dramatic inhibitory effects on photosynthesis in representative species from six divisions of marine phytoplankton and two natural sites. Oxygenic photosynthesis was inhibited as a function of increasing CO₂ concentration in the seawater media. The cellular content of ATP also decreased after treatment with CO₂. Photosystem II variable-fluorescence parameters were altered under high-concentrations of CO₂; F_v/F_m decreased and non-photochemical quench (NPQ) increased. Increases in the concentration of CO₂ gas promoted xanthophyll cycle pigment alteration to what is believed a photoprotective state. The effect of CO₂ was reversible in all metrics by returning the media to air saturation. The CO₂ effect was also light dependent and was induced far below the light compensation intensity for photosynthesis. It is suggested that the CO₂ effects described here were not due pH per se.