AER® Bioreactor Designs

I. The f₁ AER Bioreactor:

a. Two 1-W LED (one red, one blue) illuminating
b. A 10 gallon tank with lid-portal, reflective lid, reflective base and walls
c. 0.40 sq in fresh spinach leaf on elevated wire mesh
d. 0.15 mole CO₂ released from 9" OD collection sac (30% CO₂ in the 10 gal tank)
e. Average temperature of 25° C (78° F)
f. Iodine to stain glucose in spinach cells
g. Compound light microscope with image retention device

Hypothesis: The AER Bioreactor will demonstrate synthesis and retention of excess glucose in spinach cells exposed to a high CO₂ concentration

Method:

1. Divide fresh spinach leaf into control and CO₂-exposed samples
2. Collect CO₂ (sterno emission) into a 9" OD sac
3. Place demonstration samples on elevated wire mesh in the 10 gal tank
4. Place CO₂ sac in tank. Withdraw sac through
laid-port and close port: tank's ~ 30% CO\textsubscript{2} \textsuperscript{(1)}.

6. Illuminate reflective chamber with red & blue LED for _____ minutes

7. Iodine-stain control and exposed samples

8. Retain 40X, 100X images of control and exposed samples

9. Compare stained-cell counts of control / exposed samples (χ\textsuperscript{2})


\textbf{II. The f}_{ii} AER Bioreactor:}

This reactor design is for extraction of excess glucose from high CO\textsubscript{2}-exposed spinach cells.

The design's a modification of standard sugar beet glucose-extraction procedure:

\textbf{Method:}

1. Crush and float CO\textsubscript{2}-exposed leaf in water.
2. Filter and compost leaf debris
3. Process / concentrate sucrose solute

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