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ABE 304

FERMENTATION: EFFECT OF TEMPERATURE ON CELL GROWTH & XANTHAN PRODUCTION

1. Using semilog or log-log axes are necessary when there is a significant increase or decrease in data along one or both axes and it can also show a linear relationship in the rate of change of the data. As the viable cell concentration should constantly double as the cells divide, a semilog scale of this axis will be necessary to more easily show this relationship in a clear, visual manner. The growth phase end is denoted when the slope between time and concentration decreases, which begins the stable phase.
2. Growth media can vary but it needs to have components that supply nutrients required by microorganisms. Growth media must contain a carbon source, nitrogen source, water, salts, and micronutrients. The glucose in the media provides carbon. KH_2PO_4 provides phosphorus which is needed for production of phospholipids in cellular membranes and production of nucleic acids. $MgSO_47H_2O$ breaks apart into water and salts, which is used in the fluid flow in cells and microorganisms. Water makes up approximately 70% of cell mass which is why it plays an important role in the growth media. Foam created by the production of CO_2 during fermentation makes maximizing the fluid and measuring the fluid challenging which is why Antifoam A is used. Reducing foam allows for better measurements.
3. Observed yield is how much substrate is converted during the lab while the theoretical yield is what is expected of the lab and the fermentation process. Theoretical yield is found by studying the reactions involved and assumes the experiment does not have any error . Observed yield can be affected by many factors, such as varying reaction conditions, side reactions, experimental error, equipment used, etc., that can make it differ from the theoretical yield. The ratio between observed yield and theoretical yield determines the percent yield.
4. Concentration at each point on calibration curve:
    a. 0.1 g/L or 10^{-4} g/mL
    b. 0.075 g/L or $7.5x10^{-5}$ g/mL
    c. 0.05 g/L or $5x10^{-5}$ g/mL
    d. 0.025 g/L or $2.5x10^{-5}$ g/mL
    e. 0.0125 g/L or $1.25x10^{-5}$ g/mL
    f. 0 g/L

5. Calibration curves are used for finding concentration of a substance in an unknown sample by taking standard samples with known concentration and extrapolating the unknown. Since Glucose amounts are known, there is no need to make a calibration curve for it while Xanthan Gum is not known.