

Effects of NaCN and NaF on Glycolysis

Summary: My group and I tested the effects of Sodium Cyanide (NaCN) and Sodium Fluoride (NaF) on the process of glycolysis to determine whether cellular energy production is hindered or interrupted. We did this by performing separate experiments where the fermentation process was initiated in the presence of both compounds and then measured the amount of CO₂ produced for each. Our results indicate that NaCN limits the amount of fermentation that occurs while NaF shuts down glycolysis completely.

Methods & Results: My group and I created three separate respirometers out of one small test tube and one slightly larger test tube. We added 5mL of yeast solution to each of the small test tubes and then added 0.5mL of NaCN solution to test tube B and 0.5mL of NaF solution to test tube C. Next, we added enough glucose solution to all three test tubes so that each would be filled to the brim. To complete each respirometer, we placed one large test tube over each of the small test tubes so that they would become covered and closed. In doing this, we ensured that firm contact was made between the glass of both the large and small test tubes. We then quickly inverted the combined test tubes so that the mixture was trapped by the bottom of the large test tube. This configuration prevented evolved CO₂ gas from escaping the smaller test tube over the course of the experiment.

We placed all four respirometers into a ~37°C water bath and left them to react. Measurements of CO₂ gas were made at the end of a 30 minute period of time, which produced the following results:

Contents	CO ₂ Production
Test Tube A 5mL yeast Glucose solution	Large Amount
Test Tube B 5mL yeast 0.5mL Sodium Cyanide solution Glucose solution	Moderate Amount
Test Tube C 5mL yeast 0.5mL Sodium Fluoride Glucose solution	No Production

Test tube A (the control) produced a large amount of CO₂ gas, as expected. Test tube B produced a small amount of CO₂ gas, which was unexpected given that the NaCN blocks the transport of electrons from cytochrome a₃ to oxygen and has a harmful effect on cells. Test tube C showed that no CO₂ was produced, indicating that NaF effectively halts the process of glycolysis.