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Lab 7

**3a**. **What was the purpose of tube 7?**

-Tube 7 was used as a control.

**3b. How was the effect of concentration of inhibitor tested in this experiment? How did the concentration of NaF affect anaerobic fermentation in your experiment? Why?**

-The effect of the inhibitor, NaF, was tested by measuring the difference in initial and final CO2 levels. With the addition of the inhibitor it restricted the production of the CO2. Tube 5, which had the highest concentration of NaF produced the least amount of CO2. We can see that very little respiration occurred in tube 5. Additionally, we can conclude that NaF also hindered respiration in tube 4 and tube 6, both of which produced very little CO2.

**3c. Which compounds in the list are intermediates in the respiratory pathway?**

-Pyruvate and glucose are both intermediates in the respiration pathway.

**3d. Why did tube 6 produce CO2 even though an inhibitor of glycolysis was present?**

**-**Tube 6 also included 2.5mL of Na pyruvate, which is in activator of respiration. Therefore, the Na pyruvate counteracted the NaF inhibitor. Also, the Na pyruvate molecules could have interacted with the glucose molecules and produced CO2 before the inhibitor, NaF, had an opportunity hinder respiration. **3e. Compare tubes 4 and 5. How was CO2 production affected by the 10-fold increase in the amount of NaF? For example, was it also changed 10-fold?**

-Less CO2 was produced in tube five, which had five times the volume of NaF (We changed 5mL of .1M naF to 2.5mL). However, results indicate that the change in CO2 was not 5-fold as would be expected. Instead, the results indicate five times the amount of .1M NaF produced approximately a third less CO2, rather than a fifth (as one would expect) of the volume of CO2 compared with .5mL of .1M NaF).

**3f. Did magnesium (a cofactor that activates many enzymes) promote respiration? If not, what are some possible reasons?**

-Yes

**3g. Smell the contents of the tube containing the most CO2. What compound do you smell?**

**-**alcohol (beer-like smell)

**3h. What is the economic importance of fermentation by yeast?**

-Without fermentation by yeast, we would not have any good beer, wine, or bread. Also, dried yeast cells contain a significant portion of protein. Also, yeast cells contain vitamin B, riboflavin, thymine, and more.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Tube # with variable** | **Tube # Control** | **Effect of Variable on Respiration Rate** | **Mechanism for the Effect** |
| Yeast | **2-6** | 1 | Increased Respiration | Yeast act as electron acceptor and oxidizes the pyruvate from glycolysis, releasing CO2 |
| Glucose | 2-6 | 7 | Increased Respiration | More pyruvate causes increased CO2 production |
| NaF | 4-6 | 2 | Decreased Respiration | Inhibits some enzyme used during glycolysis |
| Na Pyruvate | 6 | 4 | Increased Respiration | Pyruvate is a product of glycolysis which is reduced to ethanol by yeast, producing |
| MgSO4 | 3 | 2 | Increased Respiration | Produces Mg2+ which acts as a cofactor that activates some enzymes. |

Table 12.1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Tube | 3M Na Pyruvate | .1M MgSO4 | .1M NaF | 5.0% Glucose | Water | Fill With | CO2 Produced After 40 min. (mm) |
| 1 |  |  |  |  | 7.5mL | Yeast Suspension | 0 mm |
| 2 |  |  |  | 2.5mL | 5.0mL | Yeast Suspension | 4.3mm |
| 3 |  | 5.0mL |  | 2.5mL |  | Yeast Suspension | 5.5mm |
| 4 |  |  | 0.5mL | 2.5mL | 4.5mL | Yeast Suspension | 3.5mm |
| 5 |  |  | 2.5mL\* | 2.5mL | 2.5mL\* | Yeast Suspension | .2mm |
| 6 | 2.5mL |  | 2.5mL | 2.5mL |  | Yeast Suspension | .5mm |
| 7 |  |  |  | 2.5mL | 2.5mL | Water | 6.9mm |

\*Dr. Anderson instructed us to use these volumes rather than those recommended in the book