

Name: _____ Period: _____ Date: _____

Open **peebedu.com** and navigate to **Yeast Respiration Lab**. Read the introduction screen, which describes three yeast strains and explains how you will explore the switch between aerobic respiration and alcohol fermentation. Click **Begin Experiment** to enter the workspace.

Free Response Questions

Question 1 — Conceptual Analysis

Simulation Task: Select Glucose as your substrate and observe the rate graph for about 10 seconds with the vessel open. Then click the Vessel Sealed button and watch the O₂ Level meter, the rate graph, and the Ethanol Produced counter as oxygen depletes. Note the moment when the equation display switches from aerobic respiration to alcohol fermentation.

(A) (1 pt) **Describe** the products that yeast cells generate from glucose when oxygen is unavailable.

(B) (1 pt) **Explain** why yeast cells continue to break down glucose and produce small amounts of ATP after oxygen has been completely depleted from their environment.

(C) (1 pt) **Predict** what would happen to a yeast cell's ATP production if the conversion of pyruvate to ethanol were blocked while the cell remained in an environment with no oxygen.

(D) (1 pt) **Justify** your prediction.

Question 2 — Analyze Model / Visual Representation

Simulation Task: Click *Reset Experiment*, then select *Glucose* and let the simulation run for 15 seconds with the vessel open. Observe the three lines on the rate graph. Then click *Vessel Sealed* and watch until the *O₂ Level* drops below 15% and the fermentation line appears. After 15 more seconds, click *Vessel Open* again and observe how the rate lines change as oxygen returns. Note the overall pattern on the graph.

(A) (1 pt) **Describe** how the metabolic pathway used by yeast cells changes when oxygen is removed from their environment and then restored.

(B) (1 pt) **Explain** why yeast cells produce approximately 30-32 ATP per glucose in the presence of oxygen but only 2 ATP per glucose in the absence of oxygen.

(C) (1 pt) **Represent** the branch point at pyruvate by drawing a labeled diagram that shows glucose entering glycolysis, pyruvate as the intermediate, and two diverging pathways -- one aerobic and one anaerobic -- with their respective products and approximate ATP yields.

Draw your diagram here.



(D) (1 pt) **Explain** how the loss of oxygen changes which cellular compartment of the yeast cell is producing ATP.

3.5.A.1, 3.5.A.3