Yeast Fermentation Lab---- Discovery Application

The following format is a possible discovery/inquiry approach that may be used in conjunction with the TOPS Yeast Respiration and Fermentation activity.

Day 1
A) Students will discover various aspects of cellular respiration and fermentation by observing several demonstration stations which directly or indirectly deal with the reactants and products of aerobic and anaerobic cellular respiration. At each station students will answer questions and make predictions based on their observations of the demonstration.

The following are possible demonstrations that one may use, along with various prompt questions:

1. Yeast/hydrogen peroxide (H2O2) with watch glass and glowing wood splint to show oxygen production.
   -How are the substances mixed?
   -What substance(s) is/are produced?
   -What is the purpose of the wood splint and matches?
   -What happened to the glowing splint when you expose it to the "bubbles"? Why did this happen?

2. Yeast's role in bread making-- show rising bread dough versus unleavened bread.
   -Note differences between the 2 sample breads.
   -What is happening to the batter in each case?
   -Is there a mixture involved in either of the samples? Explain.

3. Yeast, water and sugar mixture in flask with a balloon placed over mouth to show carbon dioxide production. This station can be set up with 3 separate flasks each containing different substances to show that yeast, water and sugar are all required to inflate the balloon. An extension would be to leave "clue packets" of yeast and sugar as well as a cylinder of water at the lab station. This would help students visualize the substances needed for the reaction.
   -What is happening to the balloon?
   -Why is the balloon inflating or not?
   -Can you hypothesize what substance causes the change in the balloon size?
   -What is being produced in the flask?
4. Exhale breath through drinking straw into beaker containing bromthymol blue indicator to show yellow color change, thus indicating the presence of carbon dioxide.

-What did you supply to the flask to cause a color change?
-Why was there a color change in the flask?

5. Show diagrams of aerobic and anaerobic experimental set-ups (see Figures 1 & 2, pg. 12, in TOPS Yeast Lab - teacher reference section)

-What is the visible difference between both set-ups?
-Why is the exit tube submerged into a beaker of water in the anaerobic flask--Fig. 2?
-What is the purpose of the air pump in Fig. 1?
-Do you think the difference in each of the set-ups will affect the end products produced? How?


-Using the known sample result sheet, predict which substances are present in the unknown sample.

B) Follow-up student discussion of the various discovery demonstrations.

C) Homework assigned-- possible hand-outs to introduce gas chromatography, distillation and cellular respiration. In addition, the TOPS student lab should be handed out to be pre-read.

Day 2
A) Students perform the TOPS yeast fermentation/cellular respiration lab, pp. 1-6.

Day 3
A) Extensions of lab can be done with the knowledge that the students have learned from the laboratory. In addition, various modifications can be made (i.e. changing the amounts and types of reactants) to the original TOPS lab. This material also lends itself naturally to student project possibilities.