

**TEACHER'S NOTES 5**

# HOW DOES HUMAN RESPIRATION RELATE TO RADON?

**BACKGROUND**

In this exercise, students will explore the topic of human respiration and the exchange of oxygen and carbon dioxide within the alveoli of the lungs. This material provides the background needed for exploring questions related to lung damage from radon. This latter topic is presented in the lesson plan that follows.

- Note:*
- 1. Make sure to wear protective eyeglasses when working with the ammonia solution. If the solution spills on skin, rinse immediately with plenty of water. Work in a ventilated area.**
  - 2. Make sure that students under medical care do not participate in the exercise portion of this investigation.**

**TEACHING TIPS**

It would be desirable to review basic lung anatomy and physiology with the students prior to completing this exercise. Before exercise, it may take the students about 40-50 seconds to turn the solution yellow. After exercise, it may take about 25-30 seconds.

Preparation of Stock Solution

Prepare 600 ml of stock solution for each pair of students as follows:

- 600 ml water
- 12 drops household ammonia
- approximately 70 drops bromthymol blue indicator solution

**GROUPING**

Students can work in pairs to complete the activity and subsequent analyses.

**MINIMUM RECOMMENDED TIME ALLOCATION**

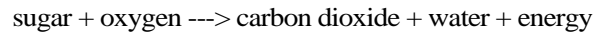
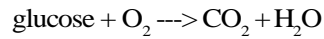
One class period.

**LEARNING PROCESS SKILLS**

<u>Science</u>	<u>Math</u>	<u>Social Studies</u>	<u>Social or Group</u>
Communicating	Classifying	Judging information related to a problem	Collaborating with others
Comparing	Investigating		
Categorizing	Analyzing		
Applying			

**STUDENT RESPONSES**

Question 8: Cellular respiration or carbohydrate metabolism, in which glucose combines with oxygen to form carbon dioxide and water



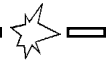
*Note:* These equations are greatly simplified.

Question 9: Results may vary, but typically fewer breaths and less time will be required to turn the solution yellow after exercise because of the larger amounts of CO<sub>2</sub> exhaled.

Question 10: The students should notice a fair amount of variability both for a given student, and also among students. This is attributable largely to variation in the rate of respiration and volume of exhaled air. The variability will probably be greater after exercise because each student will get more tired after each successive trial. Physical condition will influence these differences.

**EXTENDED ACTIVITIES**

1. Have students describe in detail the path of an oxygen atom from the atmosphere, into the lungs, through the body, and back out to the atmosphere. You will need to remind them that an oxygen atom is part of carbon dioxide (i.e., one of the O's in CO<sub>2</sub>).
2. Have students investigate the respiration rates before and after exercise (and change in rates) for individuals of different sex, weight, and height.
3. Have the students research patents originating from the scientific community that pertain to the human respiratory system. See Resources, Information Resources.





**Radon Alert**  
**Lesson Plan Evaluation Sheet**  
**and FREE POSTER AND STORYBOOK offer**

The New Jersey Department of Environmental Protection is happy to provide these lesson plans for use by teachers. In order to evaluate the use of the lesson plans, we would greatly appreciate your response to the following questions. All teachers who return these forms will receive a FREE RADON POSTER depicting information about radon in a colorful format and a STORYBOOK about a Native American child and his experience with radon in his home.

**1. Which Radon Alert lesson plan(s) did you use?**

**2. How useful did you find it/them (check one) ?**

- Not useful
- Slightly useful
- Moderately useful
- Very useful
- Extremely useful

**3. Do you plan to use them again in the future?  Yes  No**

**4. In your view, what would make the lesson plans MORE useful:**

**Your name:** \_\_\_\_\_ **Phone Number:** \_\_\_\_\_

**Subject area:** \_\_\_\_\_ **Grade:** \_\_\_\_\_

**Mailing address:**

\_\_\_\_\_  
\_\_\_\_\_

To receive your FREE RADON POSTER and STORYBOOK, mail or fax this completed form to:

**NJDEP Radon Program, P. O. Box 415, Trenton, NJ 08625**

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**(Questions? Call the Radon Program at 1-800-648-0394.)**