

Respiration laboratory handout – Trout in the Classroom

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Laboratory questions prior to experimentation:

Students may be asked to develop hypotheses regarding testing different variables including:

- a.) How do you think respiration will vary with temperature? Why?
- b.) How do you think respiration will vary with fish size? Why?
- c.) Would you suggest respiration differences if fish were individually placed in tanks or experiments were conducted on groups of fish?
- d.) Other variables that could influence respiration rate?
 - a. Have students in class list potential variables to test and develop potential experiments to address various questions.

Experimentation

- 1.) Acclimate fish to be used for respiration experiment to test temperature prior to experiment
- 2.) Prepare water bath for experimentation, fill respiration units (Fernbach Flasks)
 - a. Measure the water volume in the flasks (for oxygen calculations)
 - b. Volume _____
- 3.) Take initial dissolved oxygen reading and temperature
 - a. DO initial _____
 - b. Temperature: _____
- 4.) Weigh fish and place in chamber, fill chamber to top with water and seal with stopper (make sure not to have any air space in chamber)
 - a. Once fish is place in chamber record starting time for each chamber

Chamber	Weight	Starting time
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

- 5.) Once all fish are placed in chambers, allow fish to respire for a period of time (duration will depend on fish size and water temperature – generally 45mins to 3 hours)

6.) End of experiment, Remove stopper and take a DO reading in each chamber

a.) Record stop time

Chamber	DO final	Stop time
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

7.) Return fish back to tank (make sure water temperature is appropriate or acclimate them back to ambient temperature)

8.) Calculations

- a. Change in Dissolved oxygen → Initial – Final
- b. Duration in days → time hours to time days
- c. Milligrams of oxygen → $\Delta\text{DO} \times \text{volume}$
- d. Specific respiration rate → mg oxygen/g fish/days

Chamber	ΔDO	Duration (hours)	Duration (days)	Volume (l)	mg O ²	Spec. Respiration (mg/g/day)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Other variables to examine:

- Raise/lower temperature and repeat experiments
- Complete experiments across a wide range of sizes
- Individual vs. group experiments
- Others?

Exercises:

- 1.) Plot Specific Respiration (response variable) and predictor variables (temperature, weight)
- 2.) Examine relationships
- 3) Relate to physiology and management or hypothetical scenarios