# PhysioEx Lab Report

Exercise 7: Respiratory System Mechanics

Activity 3: Effect of Surfactant and Intrapleural Pressure on Respiration

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Date: 3 November 2025

Session ID: session-2e5168b0-6e9e-d1b4-6ced-1daeba23b45d

## Pre-lab Quiz Results

You scored 100% by answering 5 out of 5 questions correctly.

1. Which of the following statements about surface tension is *false*?

   You correctly answered: Surface tension acts to increase the size of the alveoli within the lungs.

2. Which of the following statements about surfactant is *false*?

   You correctly answered: Surfactant works by increasing the attraction of water molecules to each other.

3. Just before an inspiration begins, the pressure within the intrapleural cavity

   You correctly answered: is less than the pressure within the alveoli.

4. The respiratory condition of pneumothorax refers to

   You correctly answered: any opening that equalizes the intrapleural pressure with the atmospheric pressure.

5. A pneumothorax can lead to

   You correctly answered: atelectasis.

## Experiment Results

### Predict Questions

1. Predict Question 1: What effect will adding more surfactant have on these lungs?

   Your answer: Airflows will further increase.

2. Predict Question 2: What will happen to the collapsed lung in the left side of the glass bell jar if you close the valve?

Your answer: The lung will remain collapsed.

## Stop & Think Questions

1 Why did the sequential additions of surfactant change this lung system?

You correctly answered: Surface tension was sequentially decreased.

2 Premature infants often have difficulty breathing because the amount of surfactant in their lungs is

You correctly answered: too low.

3 What happened to the left side of the bell jar when the valve was opened?

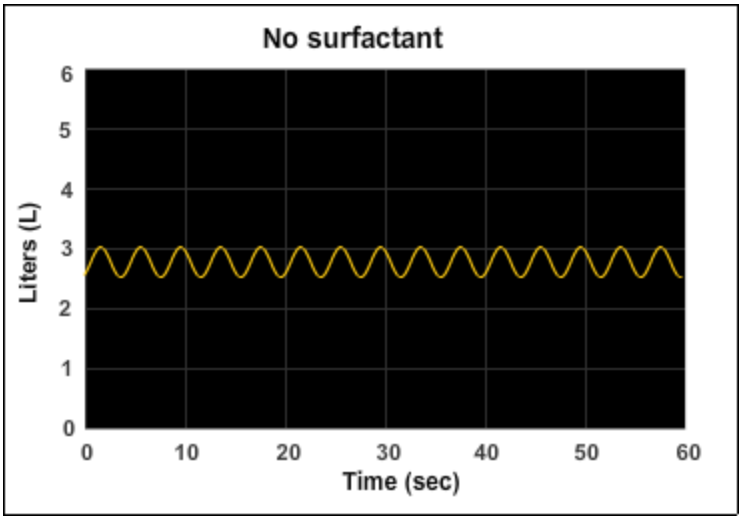
You correctly answered: The intrapleural pressure equalized with the atmospheric pressure.

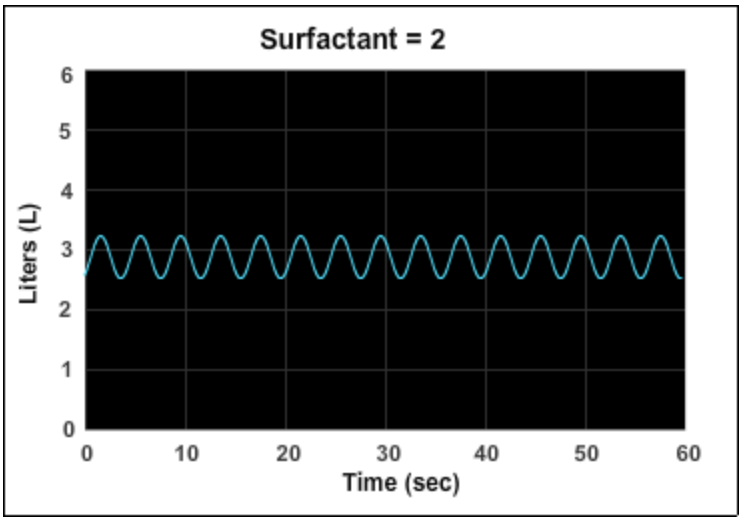
4 Did the collapsed left lung reinflate?

You correctly answered: No, it did not.

## Experiment Data

| Airway Radius (mm) | Breath Rate (breath/min) | Surfactant | Pressure Left (atms) | Pressure Right (atms) | Flow Left (ml/min) | Flow Right (ml/min) | Total Flow (ml/min) |
|---|---|---|---|---|---|---|---|
| 5 | 15 | 0 | -4.00 | -4.00 | 49.69 | 49.69 | 99.38 |
| 5 | 15 | 2 | -4.00 | -4.00 | 69.56 | 69.56 | 139.1 |
| 5 | 15 | 4 | -4.00 | -4.00 | 89.44 | 89.44 | 178.8 |
| 5 | 15 | 0 | -4.00 | -4.00 | 49.69 | 49.69 | 99.38 |
| 5 | 15 | 0 | 0.00 | -4.00 | 0.00 | 49.69 | 49.6 |
| 5 | 15 | 0 | 0.00 | -4.00 | 0.00 | 49.69 | 49.69 |
| 5 | 15 | 0 | -4.00 | -4.00 | 49.69 | 49.69 | 99.38 |

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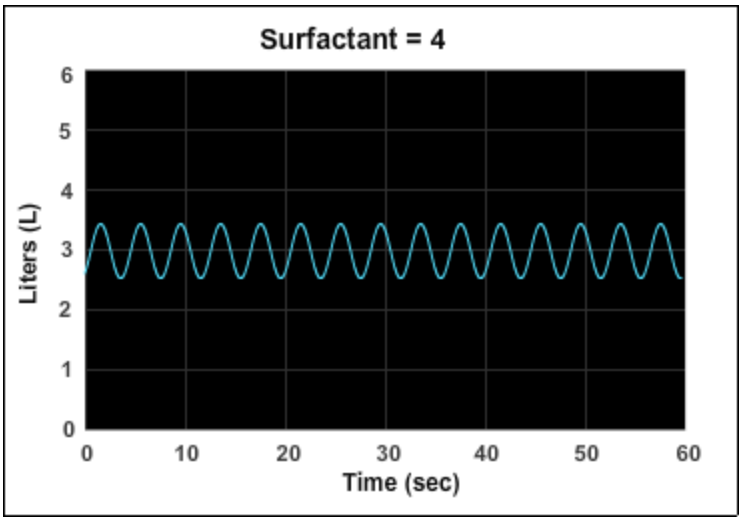
Liters (L)
0
1
2
3
4
5
6
0
10
20
30
40
50
60
Time (sec)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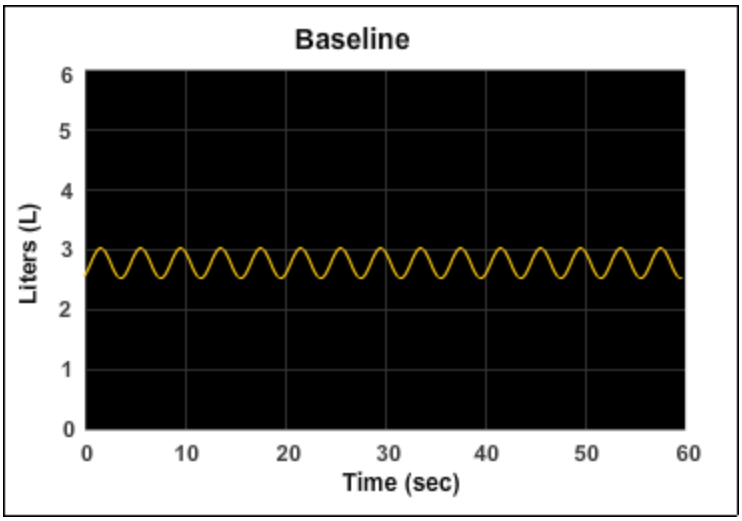
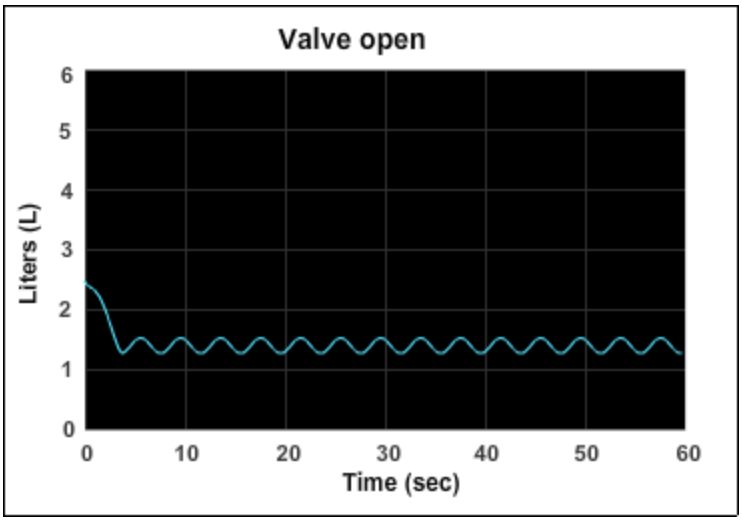
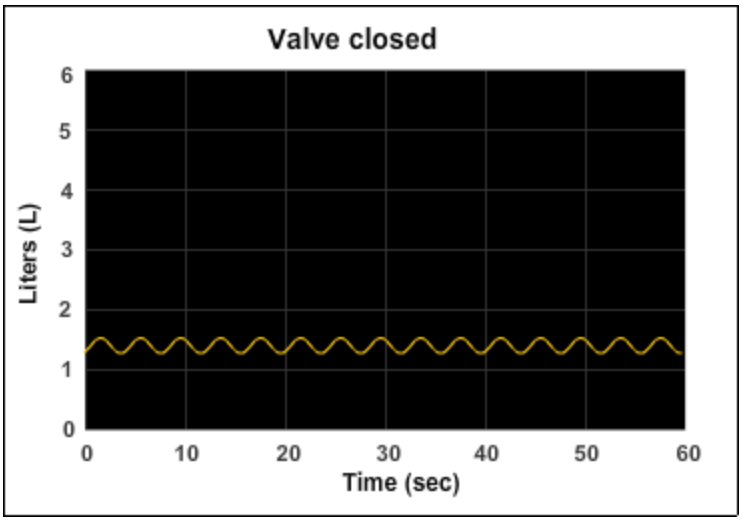
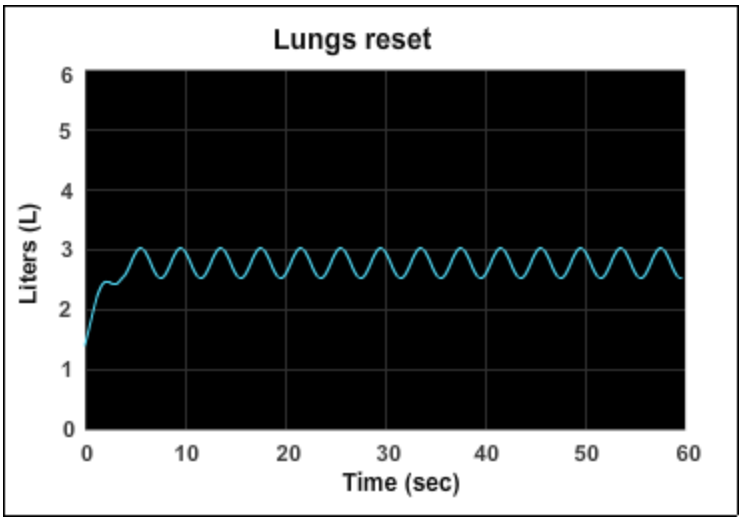
3
4
5
6
0
10
20
30
40
50
60
Time (sec)


Baseline
Liters (L)
0
1
2
3
4
5
6
0
10
20
30
40
50
60
Time (sec)




## Post-lab Quiz Results

You scored 100% by answering 4 out of 4 questions correctly.

1 The addition of surfactant to the lung interior

You correctly answered: increased airflow.

2 Opening the valve in the side of the glass bell jar

You correctly answered: simulated pneumothorax.

3 In this activity a pneumothorax is automatically followed by

You correctly answered: atelectasis.

4 The best way to rapidly reinflate a person's collapsed lung is to

You correctly answered: pump air out of the intrapleural space to recreate negative pressure.

## Review Sheet Results

1 What effect does the addition of surfactant have on the airflow? How well did the results compare with your prediction?

Your answer:

The airflow will increase since the resistance is reduced.

2 Why does surfactant affect airflow in this manner?

Your answer:

When the tension in the alveoli is decreased, it is easier to increase surface area for gas exchange.

3 What effect did opening the valve have on the left lung? Why does this happen?

Your answer:

The lung collapsed since the intrapleural and atmospheric pressure equalized.

4 What effect on the collapsed lung in the left side of the glass bell jar did you observe when you closed the valve? How well did the results compare with your prediction?

Your answer:

Closing the valve did not reserve the collapsed lung and pressure.

5 What emergency medical condition does opening the left valve simulate?

Your answer:

Atelectasis and a collapsed lung.

6 In the last part of this activity, you selected the Reset button to draw the air out of the intrapleural space and return the lung to its normal resting condition. What emergency procedure would be used to achieve this result if these were the lungs in a living person?

Your answer:

Aspiration with a needle, chest tube, or surgery.

7 What do you think would happen when the valve is opened if the two lungs were in a single large cavity rather than separate cavities?

Your answer:

Both lungs would collapse and there wouldn't be any to keep breathing.