

# Homework

[Science](#), [Physics](#)



Physics Questions: Exercise One 350c 2. -150c 3. Lower than 4. More 5. Less than 6. Dry 7. Equal to 8. Saturated

9. -270C,

10. Higher than

11. Lost

12. Less than 100%.

13. 270C

14. Higher than

15. Less than

16. Releases

17. Did

18. Clear

19. Did not

20. Was not

21. Expand and cool

22. Straight, solid, green dry

23. Did

24. Was

25. Equal to

26. Curved, dashed, blue saturated

27. Within a degree

28. Was not

29. Expand and cool

30. Straight, solid, green dry

31. Was

## Exercise Two

1. Compressing the air by squeezing the bottle was accompanied by an increase in the temperature of air inside the bottle.
2. The expansion of air that occurred when the bottle was allowed to return to its original shape and volume was accompanied by a decrease in the temperature of air inside the bottle.
3. These observations indicate that when air is compressed, its temperature increases, and when air expands, its temperature decreases.
4. Air pressure in the open atmosphere always decreases with an increase in altitude. This happens because air pressure is determined by the weight of the overlying air. Air rising through the atmosphere expands as the pressure acting on it lowers and, in turn, its temperature decreases.
5. Air sinking in the atmosphere is compressed as the air pressure acting on it increases, and its temperature increases
6. The cloud forms when the pressure acting on the saturated air lowered and the temperature decreased.
7. Most clouds in the atmosphere form in a similar way as the cloud in the bottle. With the temperature change due to expansion, some of the water vapor in the saturated air must condense, thereby forming cloud droplets.
8. Once you have a cloud in the bottle, squeeze the bottle to make the cloud disappear. The cloud disappears when the air temperature is raised by compression. The change in temperature results in evaporation of the cloud droplets.
9. It can be inferred from this investigation that in the open atmosphere where it is cloudy, air is generally rising and cooling. Burgan (123) asserts

that where the atmosphere is clear, the air is generally moving in the opposite direction.

10. Generally, high pressure areas in the atmosphere tend to be clear because air in them experiences downward motion. Low pressure areas tend to have clouds because air in them experiences motion in the reverse direction.

11. The patterns of wind directions about the high-pressure centers in eastern Maine and Wisconsin were generally clockwise and outward.

12. Wind flows from central Texas to North Dakota were generally westward or northwestward, toward rising terrain and mountainous areas. These areas experienced lifting of air by orographic effects.

13. In the eastern U. S., the front that had slowly been moving eastward was positioned near Buffalo, New York. The temperature and dewpoint at Buffalo at map time were 62 F and 61 F, respectively. Because the temperature and dewpoint at the surface were not equal, it indicated the air in Buffalo was not saturated.

14. The Buffalo station model showed the cloud cover at map time as overcast.

15. This sky cover condition did confirm that saturated air existed aloft over Buffalo.

16. The station model symbol for present weather conditions (obscured by radar echoes!) at Buffalo was two dots, a report that rain was occurring at map time.

17. Furthermore, the shadings of radar returns at Buffalo indicated that precipitation was occurring over this area. Precipitation is a result of cloud

formation and droplet growth processes.

18. Therefore, we can conclude that conditions associated with the passing frontal system were generally forcing air to rise, producing clouds in the Buffalo area.

19. On the Steve diagram, the bold irregular curve to the right is the temperature profile while the bold curve to the left is the dewpoint profile. Where the curves are superimposed, the temperatures and dewpoints are equal. The separation of the temperature and dewpoint values at and near the surface indicates that the surface air was not saturated. (From the radiosonde text data, not shown, there is a 1.7 C difference between the temperature and dewpoint at the surface.)

20. Air, rising from the surface at Buffalo, would expand and cool. The sloping frontal surface separating cooler air below and warmer air above was the primary agent lifting the humid air.

21. The rising air above Buffalo cools, and at about 975 mb, its temperature and dewpoint do become equal.

22. The air over Buffalo at 975 mb was saturated.

23. The temperatures were equal to the dewpoints from 975 mb up to about 600 mb. These equal temperature-dewpoint conditions do suggest there was an extensive, thick layer of clouds over Buffalo (Bunch, 49).

#### Works Cited

Bunch, B. H., and Hellemans, A. *The History of Science and Technology*. New York: Houghton Mifflin Harcourt, 2009. Print.

Burgan, M. *Nikola Tesla: Physicist, Inventor, Electrical Engineer*. New York: Capstone, 2011. Print.