

Lab: Blubber Glove!

(MAKEUP VERSION)

(modified from Gulf of Maine Research Institute)



Background: Whales spend much of their lives in freezing cold Arctic and Antarctic waters. During the winter, the air in the Arctic can reach $-40\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$). Antarctica, the coldest place in the world, can be below $-60\text{ }^{\circ}\text{C}$ ($-76\text{ }^{\circ}\text{F}$). Depending on the species, whales dive more than 400 or 500 meters deep in the ocean, where the water can be colder than $12\text{ }^{\circ}\text{C}$ ($54\text{ }^{\circ}\text{F}$). Their secret is blubber, a thick layer of body fat that comprises up to 50% of body weight in some marine mammals. Blubber is a thick

layer of fat (adipose) tissue. Animals store extra digested food in the form of adipose tissue, which contains molecules called lipids. Adipose tissue has a relatively low thermal conductivity, which means that it does not transfer heat as well as other tissues and materials—such as muscle or skin. That way, it helps to insulate an animal's body.

What we did in class: Students obtained two “gloves”. Glove one was filled with vegetable shortening and glove two had no vegetable shortening. Thermometers were inserted into each glove as the student placed their hands into the gloves and plunged them into a bucket of ice water. Temperatures for both gloves were recorded in 30 second intervals for a total of 5 minutes. Data was recorded as you see below.

Results:

Time (min)	Temp ($^{\circ}\text{C}$) glove one	Temp ($^{\circ}\text{C}$) glove two	Time (min)	Temp ($^{\circ}\text{C}$) glove one	Temp ($^{\circ}\text{C}$) glove two
0.5	18	16	3	14	3
1	16	10	3.5	14	3
1.5	16	8	4	13	2
2	15	6	4.5	13	1
2.5	15	4	5	13	0

Analysis:

1. What do you do to stay warm in cold water? Give at least two examples.
2. What do animals do to stay warm in cold water? Give at least two examples.
3. Compare and contrast the temperatures for each hand.
4. How is vegetable shortening similar or dissimilar to blubber?
5. What materials, other than shortening, might be used for this experiment?
6. What advantages, other than warmth, might blubber have for marine mammals?
7. Name three animals, other than whales, that have blubber.

Watch the video at https://www.youtube.com/watch?v=PhYSu6_lPJ4 to learn about how the African Penguin utilizes blubber and to see how the Blubber Glove lab data was collected.

8. How much blubber could an African Penguin have on its body? What determines the amount?
9. Describe how sea otters keep warm.

Watch the video at <https://www.youtube.com/watch?v=3S5kJP5B0I0> to learn more about the benefits of blubber for cetaceans such as dolphins.

10. What is blubber?
11. Give three benefits to having blubber.
12. What does the BAT layer do for the dolphin?