

Lab: Blubber Glove!

(modified from Gulf of Maine Research Institute)



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.

Prelab Questions:

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.

Procedure:

- a. Put a generous amount of vegetable shortening into a plastic bag.
- b. Place each hand into a glove.
- c. Put one gloved hand into the bag with shortening, surrounding your hand with shortening. This will be “glove one”.
- d. Put your other gloved hand into another bag without shortening. This is the control and will be “glove two”.
- e. Insert a thermometer into each gloved hand, centering it on your palm.
- f. Seal the top of each glove/bag around your wrist using duct tape (optional).
- g. Place both hands into the bucket of ice water and record the temperature of each hand every 30 seconds for five minutes. Record your data.

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			3		
1			3.5		
1.5			4		
2			4.5		
2.5			5		

Analysis Questions:

3. Compare and contrast the temperatures for each hand.
4. Compare and contrast your results with another student.
5. How is vegetable shortening similar or dissimilar to blubber?
6. What materials, other than shortening, might be used for this experiment?
7. What advantages, other than warmth, might blubber have for marine mammals?
8. Name three animals, other than whales, that have blubber.