

DEEP SEA DISASTER

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A different submersible owned by the parent company of the Titan.
Image from Wikimedia commons

After a search and rescue operation that intrigued many people across the world, US and Canadian Coastguard authorities have found debris from the missing submersible that disappeared during a dive to the **wreckage** of the Titanic.

The authorities said that the debris field, which contained parts of the nose and tail of the submersible were 'consistent with **catastrophic** loss of the pressure vessel', meaning that it was thought the submersible had imploded.

So what is an implosion and why do they happen?

The Titanic is one of the world's most famous shipwrecks, sinking in April 1912. The wreckage of the Titanic was discovered in 1985 and lies approximately 3,800 m below sea level in the Atlantic ocean. At that depth, pressure is over 375 times greater than it is at sea level, equivalent to a force of 4×10^7 N pushing down on every square metre.

Submersibles are designed with pressure hulls, which are made of extremely strong materials that should be able to withstand this pressure and protect the people inside. However, any structural weakness would mean that the submersible would no longer be able to withstand the pressure, causing an instant **implosion**.

Unlike an explosion, which is a rapid expansion of volume, an implosion is when an object collapses in on itself, suddenly reducing the volume. When a submarine or submersible hull collapses, this implosion occurs in approximately one millisecond, or 1/1000 of a second. This is many times less than the fastest human reaction time, which is thought to be



approximately 25 milliseconds. This means that the people on board would not even be aware of the implosion as it would happen so quickly.

The coastguard and other regulatory bodies will now investigate what went wrong with this submersible. A submersible is different from a submarine in that a submarine can launch and return itself to port, whereas a submersible requires a mothership to launch it and does not have its own power to return by itself.

Most submarines and submersibles have a pressure hull that is made of titanium and spherical in shape, to spread the effect of the pressure evenly across the vessel. The titan submersible was made of a combination of titanium and carbon fibre, which is commonly used in aircraft but is not traditionally used in deep sea **vessels**. The titan was also cylindrical in shape rather than spherical, so investigators will aim to find out how these factors may have affected the structural **integrity** of the submersible. Investigators will also be looking at the regulations for passenger deep sea submersibles to prevent similar accidents happening again.

Answer the following questions in full sentences:

1. What is this news story about?

2. Compare the pressure at 3,800 metres below sea level with the pressure at sea level.

3. Explain the difference between a submarine and a submersible.

4. Write down the meanings of any words **in bold** in the article.
