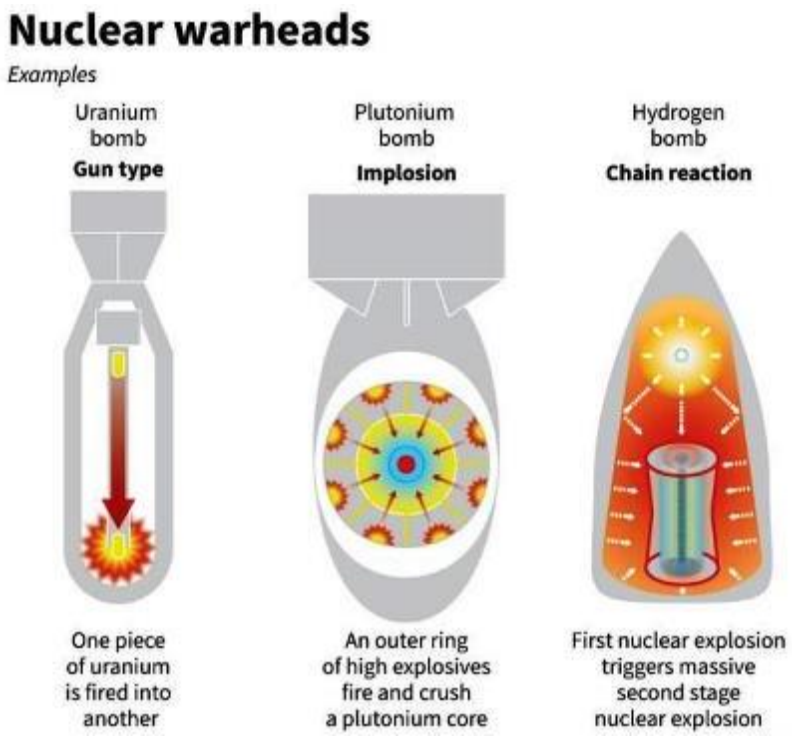
A-Bombs And H-Bombs Explained



Paris (AFP) - The world's nuclear arsenals are comprised mainly of two types of warheads -- **atomic** bombs, also called **A**-bombs, and the more powerful hydrogen or H-bombs. North Korea, escalating its war of rhetoric with the United States, on Friday hinted it may explode an H-bomb over the Pacific, having already carried out underground tests of atomic and hydrogen bombs. Here is a rundown on both types of weapon.

- The A-bomb -

This weapons have only been used twice in conflict, when the United States bombed Japan in the final days of World War II, although they have been tested several hundred times. Atomic bombs work on the principle of nuclear fission where energy is released by splitting atoms of enriched uranium or plutonium encased in a warhead.

- The first-ever explosion of an A-bomb was in a test in the deserts of the US state of New Mexico on July 16, 1945 -- the culmination of the secretive Manhattan project to develop such a weapon in the belief that Nazi Germany was doing the same.
- On August 6, the United States dropped an atomic bomb on the southern Japanese city of Hiroshima, killing 140,000 people, according to estimates.
- Three days later, a second bomb devastated Nagasaki, killing an estimated 74,000 people. Japan surrendered, bringing World War II to an end.

These bombs produced an explosive yield of roughly 20 kilotons, the equivalent to 20,000 tons of TNT. The shock wave demolished buildings of reinforced concrete and the intense heat vaporised people near the centre of the blast. Others were badly burned or succumbed to radiation-related illnesses weeks, months or years later.

The Soviet Union was the second country to test an atomic bomb in 1949; Britain became the world's third nuclear power with a test in 1952. China, France, India, North Korea and Pakistan are also confirmed to possess nuclear weapons. Israel is considered to be an undeclared nuclear power, refusing to confirm or deny that it has such weapons.

- The H-bomb -

Many times more powerful than the atomic bomb, the hydrogen or **thermonuclear** bomb works on the principle of the fusion of isotopes of hydrogen and generates temperatures on the order of those found at the sun's core.

While no H-bomb has been used in a conflict so far, the world's nuclear arsenals are comprised for the most part of such weapons. The bomb has a two-stage process with a nuclear explosion triggering *a huge increase in temperature* that in turn provokes nuclear fusion, setting off a powerful explosion.

- The US army tested the first H-bomb in 1952 in an explosion that was almost 700 times more powerful than an atomic bomb.

- A year later the Soviet Union tested its own H-bomb. In 1961 it carried out the most powerful blast to date, exploding the "Tsar Bomba" in the Arctic with a force of around 57,000 kilotons (57 megatons).
- North Korea said it tested a miniaturised H-bomb in January 2016, although scientists said the six-kiloton yield achieved then was far too low for a thermonuclear device.
- It said that its September 3 nuclear test, its sixth, was also of a hydrogen bomb. The underground blast triggered landslides in the detonation area.

Hydrogen Bomb vs. Atomic Bomb: What's the Difference?

A mushroom cloud from the world's first successful hydrogen bomb test, on Nov. 1, 1952.

Hydrogen bombs, or thermonuclear bombs, are more powerful than atomic or **"fission"** bombs. The difference between thermonuclear bombs and fission bombs begins at the atomic level.

Fisssion bombs, like those used to devastate the Japanese cities of Nagasaki and Hiroshima during World War II, work *by splitting the nucleus of an atom. When the neutrons, or neutral particles, of the atom's nucleus split, some hit the nuclei of nearby atoms, splitting them, too. The result is a very explosive chain reaction*. The bombs dropped on Hiroshima and Nagasaki exploded with the yield of 15 kilotons and 20 kilotons of TNT, respectively, according to the Union of Concerned Scientists.

In contrast, the first test of a thermonuclear weapon, or hydrogen bomb, in the United States in November 1952 yielded an explosion on the order of 10,000 kilotons of TNT.

> *Thermonuclear bombs start with the same fission reaction that powers atomic bombs — but the majority of the uranium or plutonium in atomic bombs actually goes unused. In a thermonuclear bomb, an additional step means that more of the bomb's explosive power becomes available.*

First, an igniting explosion compresses a sphere of plutonium-239, the material that will then undergo fission. Inside this pit of plutonium-239 is a chamber of hydrogen gas. The high temperatures and pressures created by the plutonium-239 fission cause the hydrogen atoms to fuse. This fusion process releases neutrons, which feed back into the plutonium-239, splitting more atoms and boosting the fission chain reaction.

Governments around the world use global monitoring systems to detect nuclear tests as part of the effort to enforce the *1996 Comprehensive Test Ban Treaty* (CTBT). There are 183 signatories to this treaty, but it is not in force because key nations, including the United States, did not ratify it. Since 1996, Pakistan, India and North Korea have carried out nuclear tests. Nevertheless, the treaty put in place a system of seismic monitoring that can differentiate a nuclear explosion from an earthquake. The CTBT International Monitoring System also includes stations that detect the infrasound — sound whose frequency is too low for human ears to detect — from explosions. Eighty radionuclide monitoring stations around the globe measure atmospheric fallout, which can prove that an explosion detected by other monitoring systems was, in fact, nuclear.