

Nuclear Accidents and Holocaust

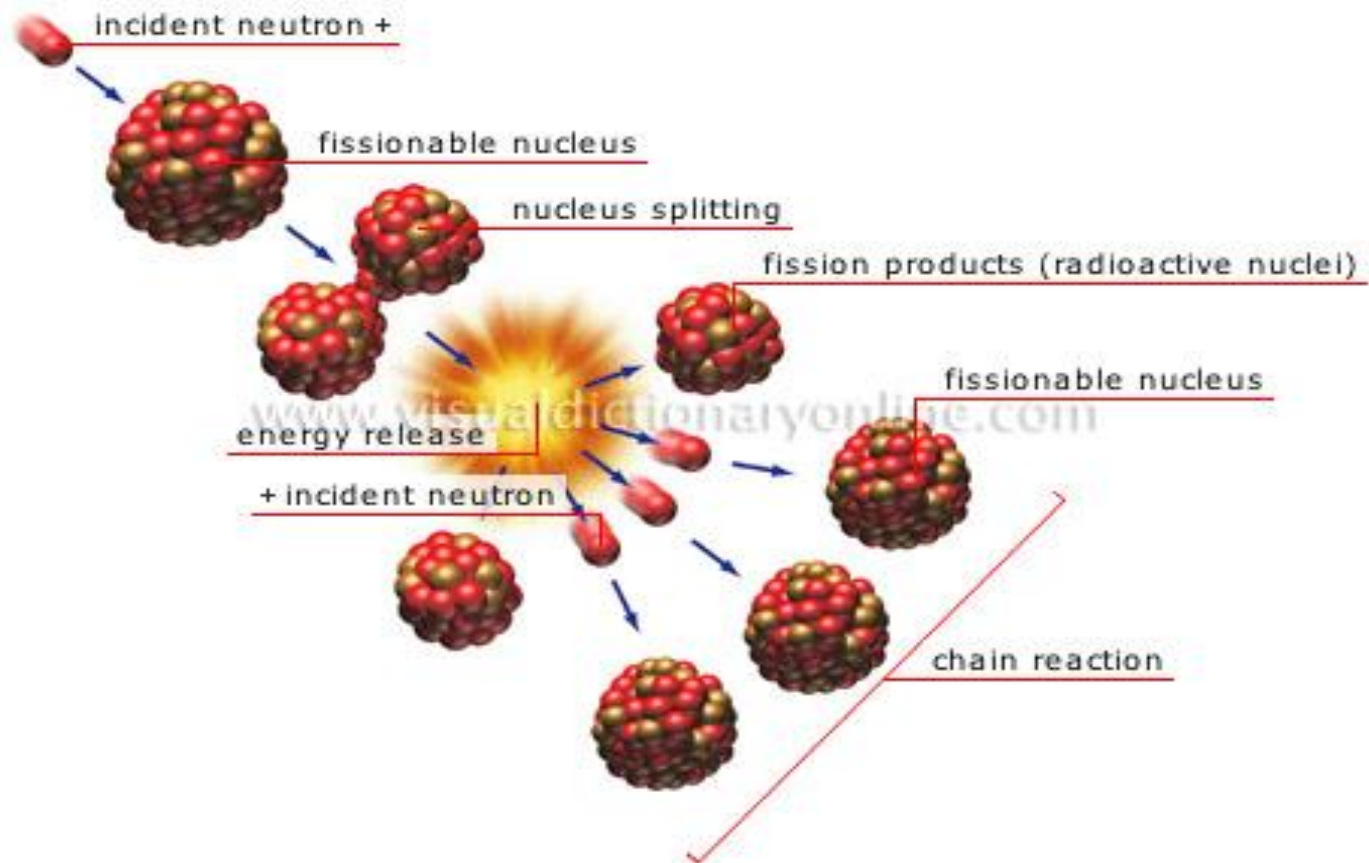


Nuclear Fission



Nuclear fission is a nuclear reaction in which the nucleus of an atom splits into smaller parts producing free neutrons, gamma rays and releasing a large amount of energy.

Nuclear Fission

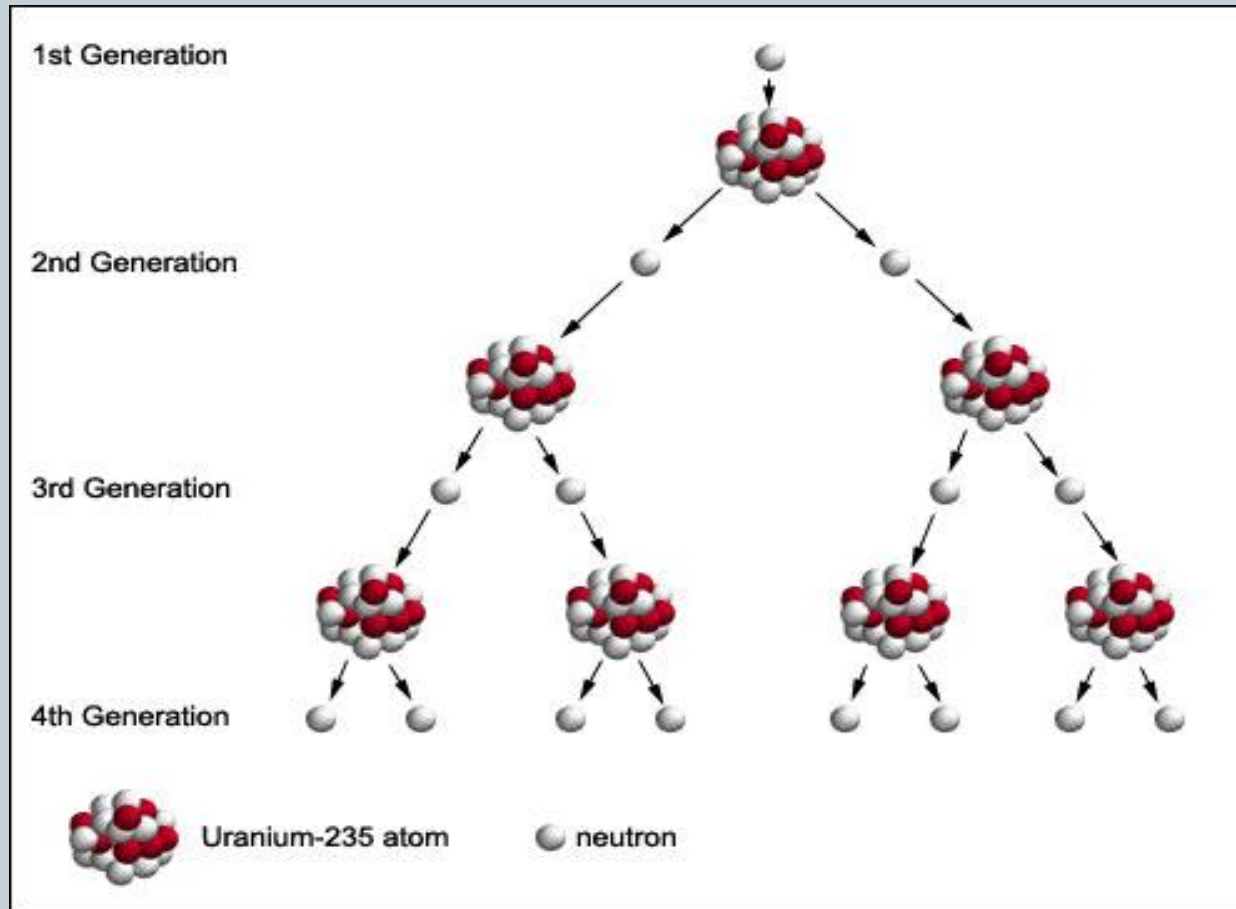


Chain Reaction



During nuclear fission, parts of the atom's nucleus that have been broken off by collision with the neutron will in turn bombard other nuclei to produce more fission.

Chain Reaction



Controlled Chain Reaction in Nuclear Reactors



Control rods

A control rod is a rod made of chemical elements capable of absorbing many neutrons without fissioning themselves. They are used in nuclear reactors to control the rate of fission of uranium and plutonium.

Coolant

Substance used to remove heat from nuclear reactors. Like water.

Nuclear Accidents



A situation in which an uncontrollable chain reaction arises in a nuclear reactor.

Examples of Nuclear Accidents



Chernobyl Disaster

Occurred on 26 April 1986 at the Chernobyl Nuclear Power Plant in Ukraine.

Consequences

- 4,000 civilian deaths
- More than 200,000 cancer deaths



Examples of Nuclear Accidents

Three Mile Island Disaster

On March 28, 1979, Reactor #2 at the Three Mile Island (TMI), USA. Fuel rods were damaged, leaking radioactive material.

Consequences

- 40,000 gallons of radioactive waste water directly in the river.
- Total cleanup cost of \$1 billion.
- 140,000 pregnant women and pre-school age children from the area.



Examples of Nuclear Accidents



Fukushima Daiichi Nuclear Disaster

Releases of radioactive materials at the Fukushima I Nuclear Power Plant, following the Tōhoku earthquake and tsunami on 11 March 2011.



Causes of Nuclear Accidents



- **Natural Disasters:** Fukushima Daiichi Nuclear Accident as caused due to Tsunami and earthquake.
- **Improper following of procedures:** The controlled nuclear reaction can be achieved only by following set of procedures. Chernobyl disaster.
- **Faulty infrastructure of reactor:** This can cause leakage of radioactive material.
- **Malfunctioning of the system:** The coolant system is affected.

Effects of Nuclear Accidents



• Biological Effects

1. **Thyroid cancer** : Caused due to radioactive Iodine which is a common radioactive material used in reactors.
2. **Loss of white blood cells and platelets** : Which impairs immune system and may cause hemorrhaging.
3. **Leukemia** : Skin cancer caused due to exposure of gamma rays.
4. **Bioaccumulation**: Of radioactive material in food chain.
5. **Genetic Mutation**: Causes changes in DNA sequence.

Effects of Nuclear Accidents



Genetic Mutation



Effects of Nuclear Accidents



- **Non Biological effects**

1. **Loss of Infrastructure:** Destruction of buildings, bridges etc.
2. **Cost of cleanup :** Total cleanup cost for Three Mile island disaster was \$1 billion
3. **Explosions:** Causes mass destruction of human lives and other life forms.
4. **Evacuations:** Immediate evacuation of people in affected areas

Effects of Nuclear Accidents



5. **Harm to Ozone layer:** The explosions causes nitrogen oxides to form from the oxygen and nitrogen in the atmosphere which depletes ozone layer.
6. **Nuclear Winters:** The absorption of sunlight when large amounts of soot are injected into the atmosphere

Prevention of Nuclear Accidents



- **Proper Disposal of radioactive wastes:** Reactor wastes can be dumped in deep unused mines
- **Awareness among public.**
- **Proper transportation:** The transporting containers must be leakage proof.
- **Making the violation of procedures a criminal offense**
- **Ban on nuclear weapons**
- **Strong infrastructure**

Nuclear Disaster and Holocaust



What is Holocaust?

The great destruction of life forms at the mass level causing genocide, that is complete destruction of a human civilization.

Nuclear Holocaust

The possibility of complete life destruction on earth due to nuclear weapons.



Nuclear Disaster and Holocaust



**“Nuclear physicists
and authors have speculated
end of human life or at least
modern civilization due to
nuclear war fares”**

Real Life Events of Holocaust



Hiroshima and Nagasaki Bombing

During the World War 2 USA Conducted 2 atomic bombs against Cities of Japan, Hiroshima and Nagasaki.

Hiroshima: August 6, 1945

Death Toll: 90,000–166,000 people

Nagasaki: August 9, 1945

Death Toll: 60,000–80,000





Thank You