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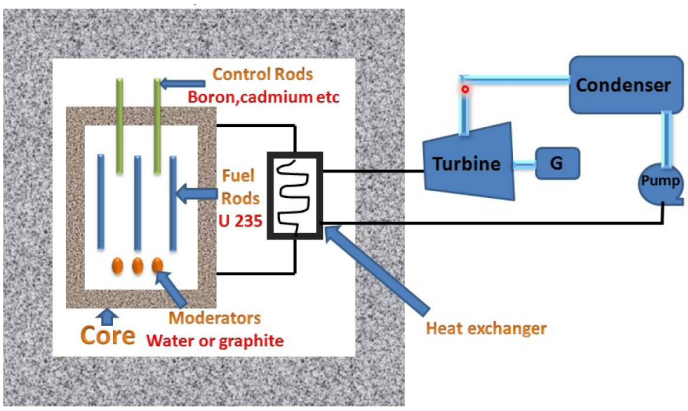
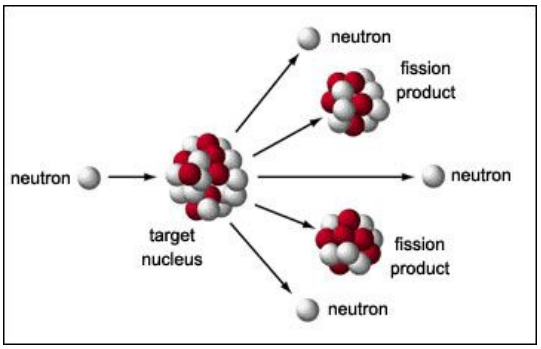
Nuclear energy is feared by many due to its potential destructive capability. The possibility of nuclear fallout and radiation leaks is a scary thought. However, rest assure that nuclear energy is actually not that dangerous. There have been three nuclear energy related incidents – the Fukushima Daiichi nuclear disaster, the Chernobyl disaster, and the Three Mile Island accident – all of which were caused by human error. However, it is now 2019 and new regulations and preventions have been developed to ensure the prosperity of one of the most reliable sources of green energy. That is right, nuclear energy is environmentally friendly as it does not generate any greenhouse gasses, such as carbon dioxide (CO_2). In fact, nuclear waste can be reused to produce more energy or even recycled to make edibles products. Who knows, maybe sometime in the future the whole world will be powered with nuclear energy. Every home could have free electricity, humanity would be less dependent on fossil fuels, and we could even have flying cars. The possibilities are endless, but first we must learn how it works before thinking of how to use it. Understanding how a nuclear reactor works is not really that complicated; it is chemistry, not rocket science. We will be looking into each phase of the process in detail. It all begins with obtaining a special and very abundant material known as uranium-235.

The first phase of the process is obtaining uranium-235 and placing it inside of a nuclear reactor. Nuclear reactors are made up three parts: fuel elements, a moderator, and control rods.

We begin with the fuel elements, which are often a set of rods that contain the uranium. Apart from uranium-235, plutonium-238 can also be used as both elements have similar characteristics. Both elements are extremely abundant, reactive, and unstable. In part this means that they release an intense amount of heat, more heat than any other element in the periodic table. That heat is what scientists harnessed and use to generate electricity. In order to do so, the element must undergo nuclear fission.



Nuclear fission is the splitting of an atom and we purposely accelerate this process by bombarding the atom with neutrons (a particle with no charge). This may sound dangerous like poking a sleeping bear with a stick, but scientist have figured out ways to control the reaction. Once an atom splits apart, its neutrons are shot into multiple directions, hitting other atoms on their way out. It is similar to a brawl made up of a thousand bumper cars constantly breaking after every crash until none is left standing. The breaking down of the atoms is what generates the high amounts of heat in the reactor.



After a second, the chain reaction begins to get out of hand as the process begins to grow and more energy is released. To regulate this process, the fuel elements are placed in the reactor core which is filled with water. The water is used both as a cooling system and as a moderator, which is a material capable of slowing down a chemical reaction.In this case, the water

molecules bump into the neutrons and slow it down. Because of this, nuclear power plants are often placed close to large bodies of water. In addition to the moderator, control rods are also used to absorb any spare neutrons. The control rods are constantly being replaced in order to keep a steady output of heat.

The heat boils up the water, which is pumped through a tube and taken from the reactor core to another tank of water called the heat exchanger. The water is not placed inside of the heat exchanger since it could be contaminated with radiation. Instead, the hot water runs through a set of pipes that radiate heat and causes the surrounding water to boil and turn into steam. That is why nuclear power plants can be seen releasing huge white clouds out of the top of their towers and in some cases, the steam is reused back into the system. While this takes place, more water is pumped into the heat exchanger tank. Before the steam is released into the environment, it must pass through a turbine that spins and generates electricity.

The way the turbine generates electricity is through the use of magnets and copper coil. A cylinder of copper coil spins along with the turbine. Within the copper coil there are a set of magnets that do not shift or move. The spinning creates a magnetic field which pushes electrons into one direction. This electrons then are sent through thousands of miles of wire. The wire then reaches a city and provides every home and building in the surrounding area with constant power.

A nuclear energy could be the future of reliable energy sources. Not only is it clean, but it is also extremely safe and not extremely complicated. It all begins with uranium-235 or plutonium-238 being placed inside a reactor core. The fuel is placed into a pool of water inside the reactor core. It is then bombarded with neutrons until an atom of uranium splits and neutrons

begin to be released. This causes a chain reaction and as more neutrons are released, more heat is produced. The heat production is regulated by water and control rods. The water turns hot and is pumped into a heat exchanger, heating up the surrounding water. The water turns into steam and passes through a turbine, which spins and generates a magnetic field. This generates electricity that travels all the way to the comfort of your own home.