

b(a). with the help of schematic, explain boiling water reactor(BWR). what is external and internal circulation?

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A boiling water reactor (BWR) is another type of nuclear reactor used for generating electricity. Unlike the pressurized water reactor (PWR), the BWR has a different design and operates with a direct cycle approach. Here is a description of a BWR:

1. Reactor Core: Similar to the PWR, the reactor core in a BWR contains fuel assemblies with enriched uranium or mixed oxide fuel pellets. The fission reactions take place within these fuel assemblies.
2. Moderator and Coolant: In a BWR, ordinary water is used both as the moderator and coolant. The water acts as a moderator by slowing down the neutrons and as a coolant by carrying away the heat generated by the fission reactions.
3. Control Rods: Control rods made of materials that absorb neutrons are inserted into the reactor core to regulate and control the nuclear reactions. By adjusting the position of the control rods, the power output of the reactor can be managed.
4. Pressure Vessel: The pressure vessel contains the reactor core and is designed to withstand high temperatures and pressure.
5. Primary Coolant Loop: In a BWR, the primary coolant loop involves a

single-loop system. The water in the reactor core, after absorbing heat from the fission reactions, boils to produce steam. This steam carries the heat energy out of the reactor core.

6. Steam Separator: The steam generated in the reactor core passes through a steam separator, which separates the steam from any remaining water droplets or moisture.

7. Turbine: The high-pressure steam from the steam separator is directed to a turbine. As the steam expands and passes through the turbine blades, it drives the turbine, which is connected to a generator to produce electricity.

8. Condenser: After passing through the turbine, the steam is directed to a condenser. In the condenser, cold water from an external source, such as a river or a cooling tower, is circulated, causing the steam to condense back into liquid water.

9. Cooling Water: The condensed water from the condenser is then pumped back to the reactor core to be used as both coolant and moderator. This completes the cycle, and the water is recirculated through the reactor core again.

External Circulation in a BWR:

External circulation refers to the flow of water from an external source, such as a river or cooling tower, into the condenser to cool the steam and condense it back into liquid water. This external water is not in direct contact with the nuclear reactions.

Internal Circulation in a BWR:

Internal circulation refers to the circulation of water within the primary coolant loop of the reactor. This includes the flow of water through the reactor core, where it absorbs heat from the fission reactions, boils to form steam, and carries the heat energy to the turbine. The condensed water is then recirculated back to the reactor core to continue the process.

