

HEAVY WATER

N. R. DAS*

Discovery of the heavier isotope of hydrogen, deuterium (D), and its oxidation product, D₂O, as heavy water, encouraged in developing a special type of nuclear reactor, namely, Heavy Water Reactor, primarily used for power generation utilizing natural uranium as nuclear fuel. Heavy water comprising of high density deuterium nuclei with low neutron absorption cross-section, acts as a moderator and controls the chain reactions in nuclear fuel material by slowing down the fast neutrons effectively, increasing the efficiency of power generation of the reactor. It also provides another route for producing fissile ²³⁹Pu entirely bypassing uranium enrichment. Amongst the various procedures generally applied for production of heavy water, the chemical processes based on isotope exchange reactions, have occupied the centre stage in heavy water production. It has also got its applications as an important isotope tracer in chemical, biological and in some sophisticated scientific investigations.
