Decontamination of Tritium from exhaust gas of IECF device

Motivation

Inertial Electrostatic Confinement Fusion (IECF) has produced neutron by using D-D reaction. However, D-D reaction has not enough neutron production rate for applications. To improve this point, using D-T reaction which can produce 200 times as much neutron than D-D reaction is planned at the experiment.

IECF device for D–T burning

• Vacuum chamber with water jacket (inner radius 25cm, outer radius 30cm)
• 6 rings Cathode made of molybdenum (inner radius 55mm, outer radius 65mm)
• 3He neutron counter calibrated by AmBe

Results

These experiments are the pretests before D–T burning at Osaka U. (with 100% deuterium gas, dry pump and TPM for clean-up of the inner wall of vacuum chamber)

Tritium handling

Decontamination of Tritium

Water Bubbling Recovery

In order to prevent the release of tritium gas, tritium gas must be decontaminated.

After the experiment, 99% tritium gas is recovered by getter material. Next, residual tritium gas in the vacuum chamber is evacuated by hydrogen discharge.

Exhaust tritium gas becomes tritium water on the surface of heated CuO(II).

DT + CuO $\rightarrow$ DT0 + Cu
T1 + CuO $\rightarrow$ T0 + Cu

Result of the experiment (Fig.17). H2 is decontaminated 99.85% in more than 300°C by this device.

Sub–critical assembly building at Osaka U.

• Using tritium is recognized in the Heavy irradiation room.
• Possible to shield 14MeV neutron.

Time Schedule

Decontamination of Tritium from exhaust gas of IECF device