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Comparison of PBMR and China HTR-10 reactor

Prevention of rad release: HTR-10 uses TRISO coated pebbles and "primary gas pressure envelope" (PGPE). PGPE consists of reactor pressure vessel, steam generator pressure vessel and hot gas duct pressure vessel (connection from reactor to SG)

MPBR pressure boundary: reactor unit pressure vessel and power conversion unit pressure vessel.

Both use spherical fuel elements

Fuel element can withstand temps to 1600C

Two operational phases planned for HTR-10. First phase, core outlet temperature of 700 C and inlet of 250 C. The second phase the core outlet temperature of 900 C and inlet of 300C with a gas turbine and steam turbine combined cycle for electricity generation. Intermediate HX provides nitrogen gas to gas turbine at 850 C (5 MWt), the steam turbine will produce other 5 MWt at 435 C

feature	PBMR	HTR-10
Power	265 MWt 100 -116 MW (electric)	10 MWt
reactor type	electrical producer	test reactor
designed by	S. Africa based on German MODUL design	designed by ECN Nuclear Research (Netherlands) based on German HTR-Module for China
operation history	expect to complete first plant construction in 2005/06	operational on December 21, 2000
fuel	TRISO-coated UO <sub>2</sub> pebble	TRISO-coated UO <sub>2</sub> pebble
diameter	60 mm	60 mm
enrichment	7.8 - 8.5%	17%
pebbles per core	360,000 - 400,000	27,000
refueling mode	continuous, multi-pass (10x)	continuous, multi-pass
average power density	4.3 MW/m <sup>3</sup> (fuel spheres only)	2 MW/m <sup>3</sup>
average discharge burnup		80,000 MWd/t
coolant	helium	helium

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