

2000

## **HYPER**

### **Design Basis of the Fission Product Assembly in the Subcritical Transmutation System HYPER**

56-1

150

HYPER(HYbrid Power Extraction Reactor)

가

가

Tc-99 I-129

HYPER

. Tc-99 I-129

(CaH<sub>2</sub>)

가

#### **Abstract**

An accelerator-driven subcritical system, named HYPER (HYbrid Power Extraction Reactor), is under development in KAERI (Korea Atomic Energy Research Institute). Although HYPER is mainly to incinerate the transuranium radioactive nuclides, long-lived FPs (Fission Products) can also be loaded for transmutation. This paper is

concerned with conceptual design of the FP assemblies for Tc-99 and I-129. To enhance the transmutation rate of the FPs, a moderator-containing FP assembly is introduced and CaH<sub>2</sub> is chosen as the moderator. The CaH<sub>2</sub> moderator is placed in the central region of the FP assembly so that detrimental effects of the moderator can be minimized.

## 1.

HYPER(HYbrid Power Extraction Reactor)

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HYPER

Tc-99 I-129

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가

[1]. Tc-99 I-129

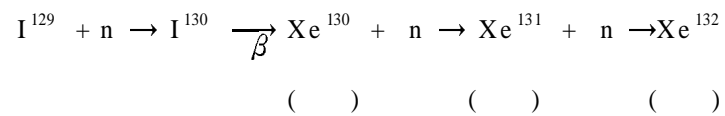
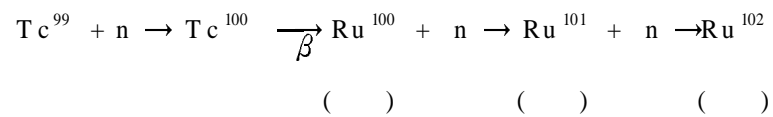
가

HYPER

Tc-99 I-129

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Tc-99 I-129



## 2.

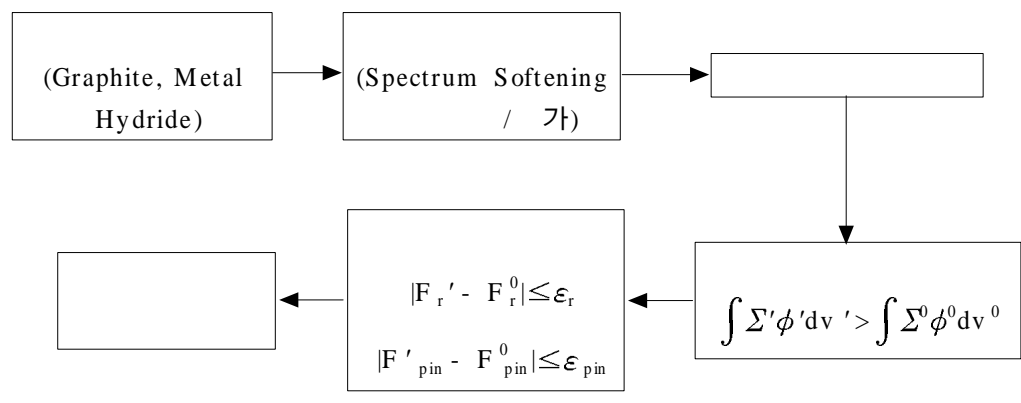
Tc-99 I-129

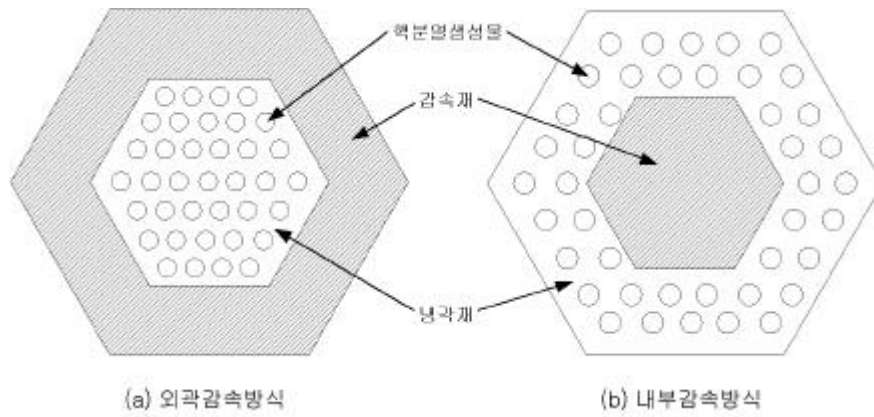
가  $\int_v \phi \times N \sigma_a dv$  가 . 가  $\sigma_a$  가  
 ,  
 가  
 가  
 가

$$\int \phi(T) \times N \sigma_a(T) dv \gg \int \phi(0) \times N \sigma_a(0) dv , T: \quad (1)$$

< 1 >  
 (Graphite) (CaH<sub>2</sub>)[2] ,  
 가  
 ( , < 2 > ) 가

(  $\int \Sigma^0 \phi^0 dv^0$  )  
 (  $\int \Sigma' \phi' dv'$  )  
 (F<sub>r</sub>')  
 (F<sub>pin</sub>') 가 (F<sub>r</sub><sup>0</sup>, F<sub>pin</sub><sup>0</sup>)  
 가





< 2 >

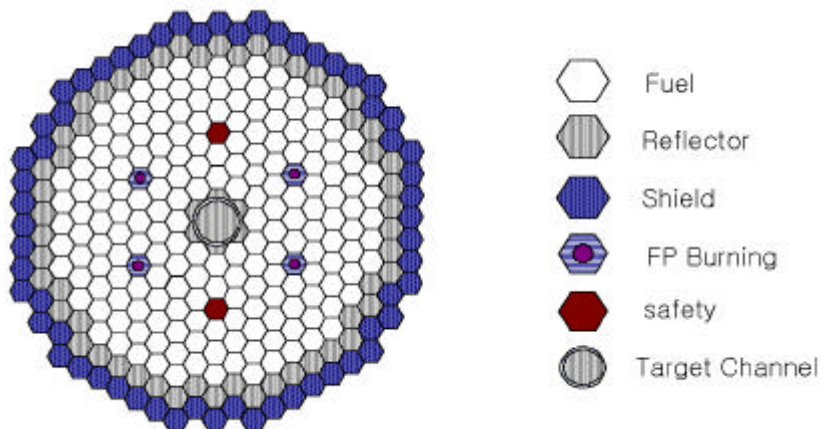
### 3. 가

3.1

HYPER < 3 > , 1/2  
 TRU TRU:Zr=0.37:0.63( ) ,  
 : =0.6:0.4( )  
 Tc-99 Tc ( =11.5g/cc) , I-129 NaI ( )  
 =3.67g/cc) .[1]  
 MCNP

300K

가



< 3 > HYPER

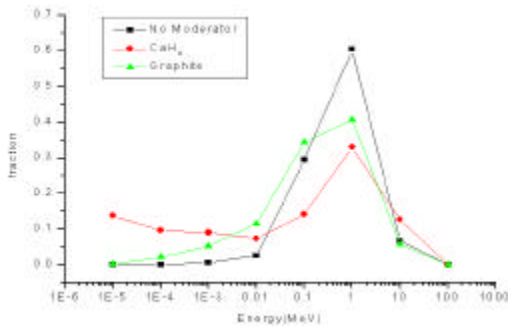
3.2

(Graphite) (CaH<sub>2</sub>,  
=1.95g/cc) < 2> (a) (=5cm)

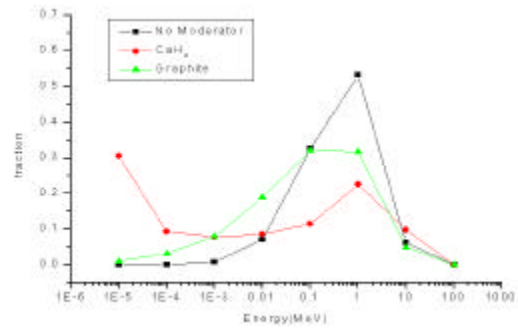
.(< 4> < 5>)

가

I-129 가 Tc-99 가 , I-129  
Na . I-129  
가 Tc-99



< 4> Tc-99



< 5> I-129

3.3

< 6> < 7>

( )  
(< 2> ), 1cm 5cm  
( )

, 가 Tc-99 I-129

가 .(< 6>)

I-129 Tc-99

, Tc-99가 I-129 가 (< 7>),

Tc-99 Tc

I-129 NaI

Tc-99가 I-129

130% , Tc-99 4%, I-129 99% , Tc-99 5%, I-129 , I-129 Tc-99 가 .

( < 4> < 5> ) I-129

Na

Tc-99

가 , I-129 가 Tc-99

I-129

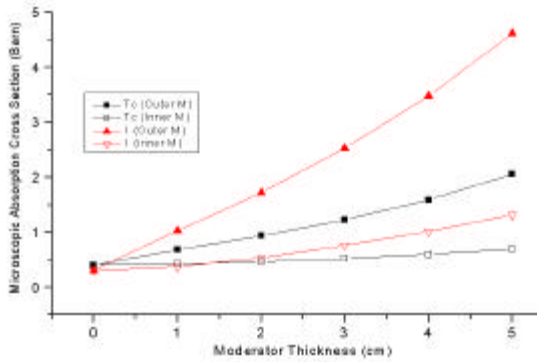
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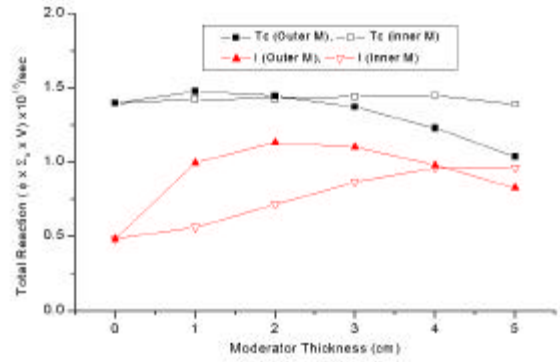
가 5cm

I-129

5cm



< 6>



< 7>

3.4

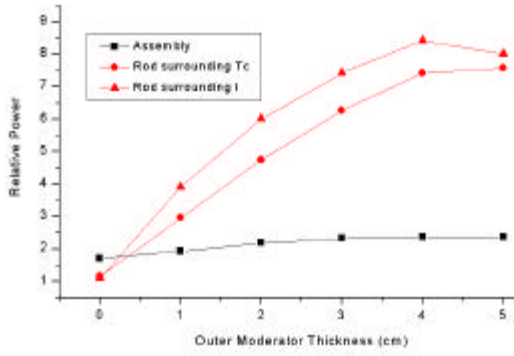
, (< 8> < 9> )

가 가

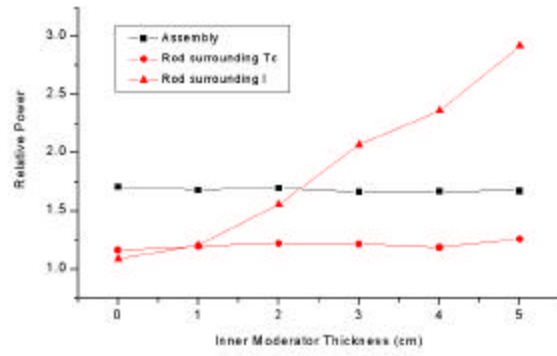
가

가

가



< 8 >



< 9 >

4.

가

Tc-99 I-129

HYPER

가

가

Tc-99

가

4%

I-129

Tc-99 I-129

P/D ,

[1] 4 , "HYPER " , KAERI/TR-1316/99

[2] D. Lelièvre, et al. "Perspectives and Cost of Partitioning and Transmutation of Long-lived Radionuclides", EUR 17485 EN, 1996