

Co - 60 Rig

Optimization of Co - 60 Production Rig in HANARO

150

Co-60 가 .
 Co-59 pellet . Co-
 60 . Co-59
 가
 Co-
 60 .

Abstract

The applicability of Co-60 is very high in medical and industrial fields. The optimized way for the production of small Co-59 pellets for medical use is investigated. The important factors in Co-60 production are production mass and specific activity. For higher specific activity, aluminum, which is a good moderator and has good conductivity, is mixed with Co-59 and the specific activity is enhanced satisfactorily exceeding the requirement for medical use of Co-60. The measure to increase the production mass and specific activity of Co-60 at an appropriate irradiation hole economically should be investigated considering the neutron utilization fee.

1.

Co-60 Co-59 99.9% pellet slug
 pellet 1
 mm, 1mm slug 6.4 mm, 25.5 mm .
 slug
 2 가 Co-60
 Co-59

Co-60 가 Co-60 150-450 Ci/g .
Ci가 5-7 5 300 Ci/g 6,000

Co-60 rig rig
Co-60 Co-60 rig

2.

Co-59 37.18 b
가

1) Co-60 .
가 () 2

가 가 (CT, IR1&2),
가 (OR3-6),
(IP1-17, HTS, PTS, CNS, LH, NTD)

on-power loading fission moly 가
Co-59

. IP 5
가

2) Co-60 가 .
Co-59 12.5 mk 가
Co-59가 18
Co-59

3) Co-59 가 Co-60

가 가

3.

MCNP Co-59 Co-59 Co-59 MCNP
, Co-59 Co-60

가

1) MCNP 가 MCNP

Co-59가

2) 가 24 MW 가 , 2/1 가

MCNP 10가

- 1:
- 2: IR1 1 40 mm, 34 mm, 50 cm
1 mm, 1 mm Co-59 pellet Co-59 8.8 g/cc
5 g/cc 가 Co-59 0.872 kg 가
- 3: 2 CT 18 18
Co-59 pellet MCNP
0.078 cm Co-59 70 cm 8.8 g/cc 가
1.1 kg
- 4: 3 18 He
- 5: 4 H₂O
- 6: 5 He H₂O
- 7: 6 H₂O 18
- 8: 5 CT가 OR3
- 9: 6 Co-59 Co-59 1:1 4.12 g/cc
Co-59 0.257 kg
- 10: 9 Co-59 1:2 3.5 g/cc Co-59
0.146 kg

1 0.257 kg, 10 0.146 kg Co-59
 2 0.872 kg, 2-7 1.1 kg, 2 0.872 kg Co-59
 가 IR1 10 mk 가 4 CT 1.1 kg 15 mk
 가 18 6 mk 가

1 Co-60 Co-59 (n, gamma)
 100 eV peak가 1 keV 0.1 MeV resonance가
 0.625 eV , 1 keV , 0.1 MeV 4
 Co-60 MCNP

1. Co-60

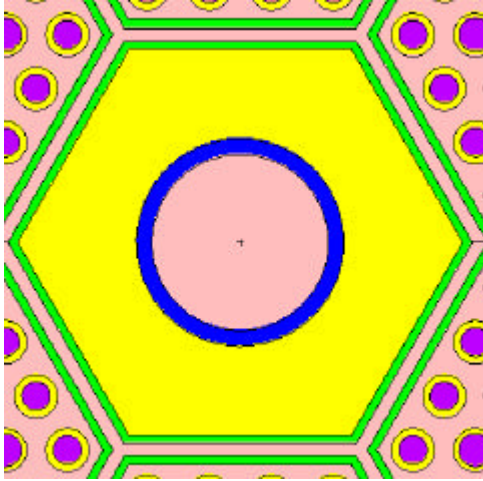
	/			(#/cc/s)	(n/cm2/s)	(b)	(Ci/g)*	(g)
1	block							
2	3 Co-59 pellet /Al	IR1	-10.4	1.01E14	4.01E14	4.91	92.2	872
3	1 Co-59 pellet 18 /Al	CT	-8.6	2.04E14	6.15E14	3.68	105.2	1100
4	1 Co-59 pellet He/Al	CT	-14.9	1.68E14	2.35E14	7.96	87.8	1100
5	1 Co-59 pellet He/Al+	CT	-16.7	2.28E14 (1.88E14)	5.50E14 (0.89E14)	4.63 (23.5)	117.6	1100
6	1 Co-59 pellet /Al+	CT	-27.2	3.48E14 (3.11E14)	5.37E14 (1.35E14)	7.21 (25.6)	173.0	1100
7	1 Co-59 pellet 18 /Al+	CT	-9.0	2.50E14 (2.07E14)	6.03E14 (0.98E14)	4.61 (23.6)	127.6	1100
8	1 Co-59 pellet He/Al+	OR3	-6.0	2.07E14	1.74E14	1.33	11.3	1100
9	1 Co-59+Al (1:1) pellet /Al+	CT	-14.5	1.23E14	6.82E14	8.60	249.8	257
10	1 Co-59+Al (1:2) pellet /Al+	CT	-14.9	1.13E14 (1.03E14)	5.96E14 (1.71E14)	16.0 (50.5)	372.2 (225.1)**	146

* 28 -7 700

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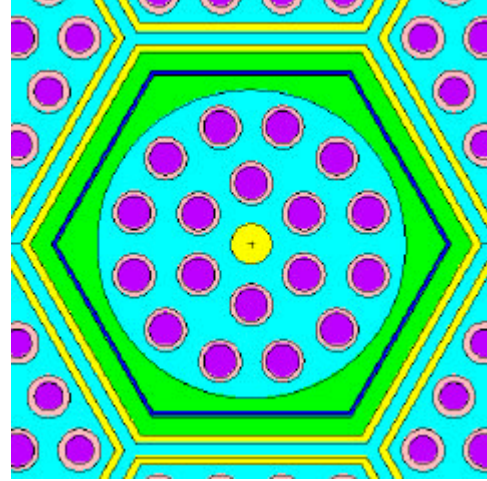
2 Co-59

He 4 2
 4 1:1 5
 2 117.6 Ci/g 가 7 6



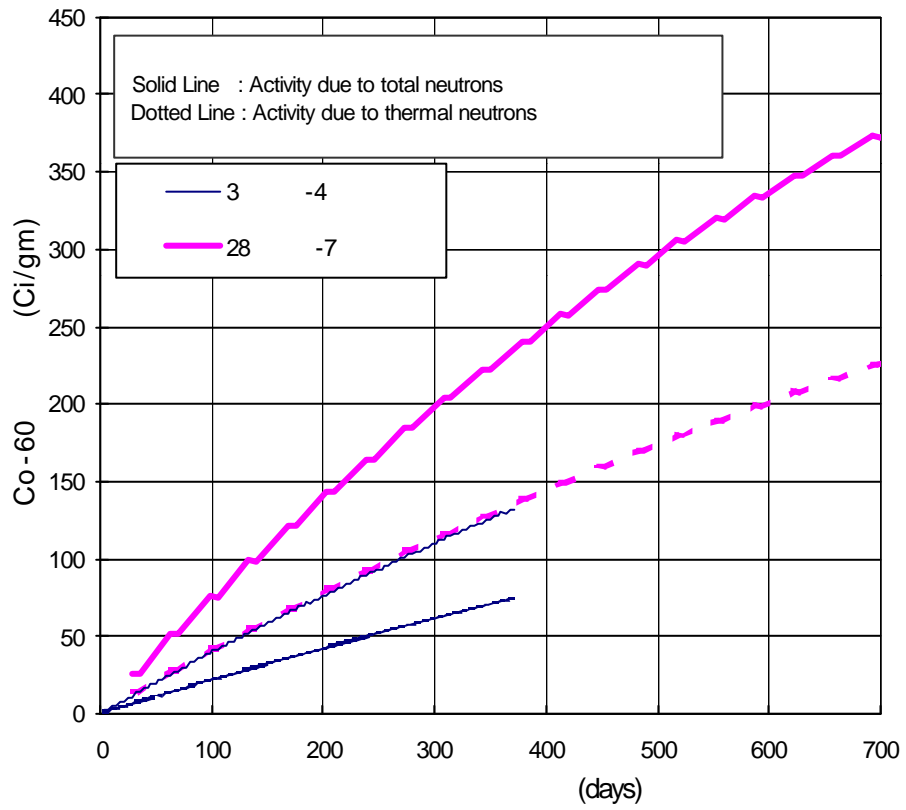
1. IR1

Co - 59



2. CT 18

Co - 59



3.

Co - 60