Table I Shell Structure of Stable Nuclides①②

Nuclide	Z	A	Shell Structure of Nucleon (*p/n*) 1	2	3	4	5	6	7	$\frac{\Sigma P}{n}$	King of Structure	Binding Energy Δ (MeV)	1^{π}	Fulling Level (%)
H	1	1	1/							1/		7.289	$1/2^+$	99.985
		2	/1	/1						1/1		13.136	1^+	0.015
He	2	3	1/	1/1						2/1		14.931	$1/2^+$	0.000138
			4	2/2						2/2	○	2.425	0^+	99.99986*
Li	3	6		2/2	1/1					3/3	○	14.087	1^+	7.50**
		7	1/	2/2	1/1					3/4	⊙	14.908	$3/2^-$	92.50
Be	4	9	1/	2/2	2/2					4/5	⊙	11.348	$3/2^-$	100.0
B	5	10		2/2	3/3					5/5	○	12.052	3^+	19.80
		11	/1	2/2	3/3					5/6	⊙	8.668	$3/2^-$	80.20
C	6	12		2/2	4/4					6/6	○	0	0^+	98.89
		13	/1	2/2	4/4					6/7	⊙	3.125	$1/2^-$	1.11
N	7	14		2/2	5/5					7/7	○	2.863	1^+	99.63
		15	/1	2/2	5/5					7/8	⊙	0.102	$1/2^-$	0.366
O	8	16		2/2	6/6					8/8	○	-4.737	0^+	99.76***
		17	/1	2/2	6/6					8/9	⊙	-0.810	$5/2^+$	0.038
		18		2/2	5/7	1/1				8/10	○	-0.783	0^+	0.204****
F	9	19	/1	2/2	6/6	1/1				9/10	⊙	-1.487	$1/2^+$	100.0
Ne	10	20		2/2	6/6	2/2				10/10	○	-7.043	0^+	90.51
		21	/1	2/2	6/6	2/2				10/11	⊙	-5.733	$3/2^+$	0.27
		22		2/2	5/7	3/3				10/12	○	-8.026	0^+	9.22
Na	11	23	/1	2/2	6/6	3/3				11/12	⊙	-9.530	$3/2^+$	100.0
Mg	12	24		2/2	6/6	4/4				12/12	○	-13.931	0^+	78.99
		25	/1	2/2	6/6	4/4				12/13	⊙	-13.191	$5/2^+$	10.00
		26		2/2	5/7	5/5				12/14	○	-16.212	0^+	11.01
AI	13	27	/1	2/2	6/6	5/5				13/14	⊙	-17.194	$5/2^+$	100.0
Si	14	28		2/2	6/6	6/6				14/14	○	-21.491	0^+	92.23
		29	/1	2/2	6/6	6/6				14/15	⊙	-21.894	$1/2^+$	4.67
		30		2/2	5/7	7/7				14/16	○	-24.092	0^+	3.10
P	15	31	/1	2/2	6/6	7/7				15/16	⊙	-24.440	$1/2^+$	100.0

* $^{4}_{2}He_{2}$ is two-shelled full-filled nuclide of the "○"category .Its *p/n* is 2/2 .There is only one combination for its full-filled *p/n* on the 2nd shell.

* *The proton-neutron pairing on the outside shell is an important prerequisite for a stable nuclide .Most of the stable nuclides bear this characteristic.

*** $^{16}_{8}O_8$ $^{17}_{8}O_9$are full-filled nuclide of 3 shells. The 3rd shell *p/n* is 6/6; the 3rd shell p/n of $^{18}_{8}O_{10}$ is 5/7 .The stable isotope of oxygen shows that *p/n* =6/6 and *p/n* =5/7 are the stable combinations of the 3rd shell.

Shell Structure of Stable Nuclides

Nuclide	Z	A	Shell Structure of Nucleon (*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	Fulling Level (%)
S	16	32		2/2	6/6	8/8				16/16	○	-26.015	0^+	95.02
		33	/1	2/2	6/6	8/8				16/17	⊙	-26.586	$3/2^+$	0.75
		34		2/2	5/7	9/9				16/18	○	-29.931	0^+	4.21
		36		2/2	6/6	8/12				16/20	○	930.666	0^+	0.017*
C1	17	35	/1	2/2	6/6	9/9				17/18	⊙	-29.014	$3/2^+$	75.77
		37	/1	2/2	5/7	10/10				17/20	⊙	-31.762	$3/2^+$	24.23
Ar	18	36		2/2	6/6	10/10				18/18	○	-30.321	0^+	0.337
		38		2/2	5/7	11/11				18/20	○	-34.715	0^+	0.063
		40		2/2	6/6	10/14				18/22	○	-35.040	0^+	99.60**
K	19	39	/1	2/2	6/6	11/11				19/20	⊙	-33.806	$3/2^+$	93.26
		41	/1	2/2	5/7	12/12				19/22	⊙	-35.560	$3/2^+$	6.73
Ca	20	40		2/2	6/6	12/12				20/20	○	-34.847	0^+	96.94**
		42		2/2	5/7	12/12	1/1			20/22	○	-38.544	0^+	0.647***
		43	/1	2/2	5/7	12/12	1/1			20/23	⊙	-38.405	$7/2^-$	0.135
		44		2/2	6/6	10/14	2/2			20/24	○	-41.466	0^+	2.09***
		46		2/2	5/7	10/14	3/3			20/26	○	-43.138	0^+	3.5×10^{-5}
		48		2/2	6/6	10/14	2/6			20/28	○	-44.216	0^+	0.187****
Sc	21	45	/1	2/2	5/7	12/12	2/2			21/24	⊙	-41.066	$7/2^-$	100.0
Ti	22	46		2/2	5/7	12/12	3/3			22/24	○	-44.123	0^+	8.20
		47	/1	2/2	5/7	12/12	3/3			22/25	⊙	-44.931	$5/2^-$	7.40
		48		2/2	6/6	10/14	4/4			22/26	○	-48.488	0^+	73.70
		49	/1	2/2	6/6	10/14	4/4			22/27	⊙	-48.599	$7/2^-$	5.40
		50		2/2	5/7	10/14	5/5			22/28	○	-51.432	0^+	5.20
V	23	50		2/2	6/6	10/14	5/5			23/27	○	-49.219	6^+	0.250
		51	/1	2/2	6/6	10/14	5/5			23/28	⊙	-52.199	$7/2^-$	99.750
Cr	24	50		2/2	5/7	12/12	5/5			24/26	○	-50.258	0^+	4.35
		52		2/2	6/6	10/14	6/6			24/28	○	-55.415	0^+	83.79
		53	/1	2/2	6/6	10/14	6/6			24/29	⊙	-55.284	$3/2^-$	9.50
		54		2/2	5/7	10/14	7/7			24/30	○	-56.931	0^+	2.36

**** $^{18}_{8}O_{10}$ posses the characteristics of a 4-shelled nuclide.

*For a full-folled proton,the *p/n*=1 on the most outside shell is not a necessary pre-requisite for a stable nuclide. However, the stability of $^{36}_{16}S_{20}$ indicates that the nucleons whose *p/n*'s on all shells are even combinations are more and more stable.

** $^{40}_{18}Ar_{22}$ and $^{40}_{20}Ca_{20}$ show that *p/n*=10/14, *p/n*=12/12 are the two stable combinations of the *p/n*'s on the 4th shell.

*** $^{42}_{20}Ca_{22}$ and $^{44}_{20}Ca_{24}$ bear obvious characteristics of the 5th shell.

****The proton-neutron pairing is the necessary prerequisite for the formation of nuclides. After the proton and neutron of $^{48}_{20}Ca_{28}$ have pared on the outside shell the remaining 4 neutrons and the inside-shell neutrons become pairs, showing that the nucleons of neighboring shells may also pair. The nuclides whose nucleons are all even-even combinations are more stable.

Mu	25	55	/1	2/2	6/6	10/14	7/7			25/30	⊙	-57.710	$5/2^-$	100.0

Shell Structure of Stable Nuclides

Nuclide	Z	A	Shell Structure of Nucleon (*p/n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	Fulling Level (%)
			1	2	3	4	5	6	7					
Fe	26	54		2/2	5/7	12/12	7/7			26/28	○	-56. 251	0^+	5.80
		56		2/2	6/6	10/14	8/8			26/30	○	-60. 604	0^+	91.80
		57	/1	2/2	6/6	10/14	8/8			26/31	⊙	-60. 179	$1/2^-$	2.15
		58		2/2	5/7	10/14	9/9			26/32	○	-62. 152	0^+	0.29
Co	27	59	/1	2/2	6/6	10/14	9/9			27/32	⊙	-62. 226	$7/2^-$	100.0
Ni	28	58		2/2	5/7	12/12	9/9			28/30	○	-60. 224	0^+	68.30
		60		2/2	5/7	10/14	10/10			28/32	○	-64. 470	0^+	26.10
		61	/1	2/2	6/6	10/14	10/10			28/33	⊙	-64. 219	$3/2^-$	1.13
		62		2/2	5/7	10/14	11/11			28/34	○	-66. 745	0^+	3.59
		64		2/2	6/6	10/14	10/14			28/36	○	-67. 098	0^+	0.91*
Cu	29	63	/1	2/2	6/6	10/14	11/11			29/34	⊙	-65. 578	$3/2^-$	69.20
		65	/1	2/2	5/7	10/14	12/12			29/36	⊙	-67. 262	$3/2^-$	30.80
Zn	30	64		2/2	6/6	10/14	12/12			30/34	○	-66. 001	0^+	48.60
		66		2/2	5/7	10/14	13/13			30/36	○	-68. 898	0^+	27.90
		67	/1	2/2	5/7	10/14	13/13			30/37	⊙	-67. 880	$5/2^-$	4.10
		68		2/2	6/6	10/14	12/16			30/38	○	-70. 006	0^+	18.80
		70		2/2	6/6	10/14	12/18			30/40	○	-69. 560	0^+	0.62
Ga	31	69	/1	2/2	5/7	10/14	14/14			31/38	⊙	-69. 322	$3/2^-$	60.10
		71	/1	2/2	5/7	10/14	14/16			31/40	⊙	-70. 142	$3/2^-$	39.90
Ge	32	70		2/2	5/7	10/14	15/15			32/38	○	-70. 561	0^+	20.50
		72		2/2	6/6	10/14	14/18			32/40	○	-72. 583	0^+	27.40
		73	/1	2/2	6/6	10/14	14/18			32/41	⊙	-71. 294	$9/2^+$	7.80
		74		2/2	6/6	10/14	14/20			32/42	○	-73. 422	0^+	36.50
		76		2/2	6/6	10/14	14/22			32/42	○	-73. 214	0^+	7.80
As	33	75	/1	2/2	5/7	12/12	14/20			33/42	⊙	-73. 0 34	$3/2^-$	100.0
Se	34	74		2/2	5/7	10/14	17/17			34/40	○	-72. 213	0^+	0.87
		76		2/2	6/6	10/14	16/20			34/42	○	-75. 259	0^+	9.0
		77	/1	2/2	6/6	10/14	16/20			34/43	⊙	-74. 606	$1/2^-$	7.60
		78		2/2	6/6	10/14	16/22			34/44	○	-77. 032	0^+	23.50
		80		2/2	6/6	10/14	16/24			34/46	○	-77. 761	0^+	49.80

*The outside-shell *p/n* = 10/14 of $^{64}_{28}Ni_{36}$ is a stable combination of the *p/n* on the 3rd shell. *p/n* = 5/7,*p/n* = 10/14 and *p/n* = 20/28 are respectively the stable combinations of the 3rd,4th and 5th shell, the ratio being invariably 1/1.4.The nuclides whose outside-shell *p/n* is 1/1.4 are more likely to be stable.

		82		2/2	6/6	10/14	16/26			34/48	○	-77. 586	0^+	9.20
Br	35	79	/1	2/2	5/7	10/14	18/20			35/44	⊙	-76. 070	$3/2^-$	50.69

Shell Structure of Stable Nuclides

Nuclide	Z	A	Shell Structure of Nucleon (*p*/*n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	Fulling Level (%)
			1	2	3	4	5	6	7					
		81	/1	2/2	5/7	10/14	18/22			35/46	⊙	77.976	$3/2^-$	49.31
Kr	36	78		2/2	5/7	10/14	19/19			36/42	○	74.150	0^+	0.356
		80		2/2	6/6	10/14	18/22			36/44	⊙	77.897	0^+	2.27
		82		2/2	6/6	10/14	18/24			36/46	○	-80.591	0^+	11.60
		83	/1	2/2	6/6	10/14	18/24			36/47	⊙	-79.985	$9/2^+$	1105.
		84		2/2	6/6	10/14	18/26			36/48	○	-82.432	0^+	57.0
		86		2/2	6/6	10/14	18/28			36/50	○	-83.263	0^+	17.30
Rb	37	85	/1	2/2	5/7	12/12	18/26			37/48	⊙	-82.159	$5/2^-$	72.17
		87	/1	2/2	5/7	12/12	18/28			37/50	⊙	-84.596	$3/2^-$	27.83
Sr	38	84		2/2	6/6	10/14	20/24			38/46	○	-80.641	0^+	0.56
		86		2/*2	6/6	10/14	20/26			38/48	○	-84.512	0^+	9.80
		87	/1	2/2	6/6	10/14	20/26			38/49	⊙	-84.869	$9/2^+$	7.0
		88		2/2	6/6	10/14	20/28			38/50	○	-87.911	0^+	82.60
Y	39	89	/1	2/2	5/7	12/12	20/28			39/50	⊙	-87.695	$1/2^-$	100.0*
Zr	40	90		2/2	5/7	12/12	20/28	1/1		40/50	○	-88.765	0^+	51.50**
		91	/1	2/2	5/7	12/12	20/28	1/1		40/51	⊙	-87.892	$5/2^+$	11.20**
		92		2/2	6/6	10/14	20/28	2/2		40/52	○	-88.456	0^+	17.10
		94		2/2	5/7	12/12	18/30	3/3		40/54	○	-87.264	0^+	17.40***
		96		2/2	6/6	10/14	18/30	4/4		40/56	○	-85.445	0^+	2.80
Nb	41	93	/1	2/2	5/7	12/12	20/28	2/2		41/52	⊙	-87.209	$9/2^+$	100.0****
Mo	42	92		2/2	6/6	12/12	20/28	2/2		42/50	○	-86.807	0^+	14.80
		94		2/2	5/7	12/12	20/28	3/3		42/52	○	-88.412	0^+	9.30
		95	/1	2/2	5/7	12/12	20/28	3/3		42/53	⊙	-87.712	$5/2^+$	15.90
		96		2/2	6/6	10/14	20/28	4/4		42/54	○	-88.795	0^+	16.70
		97	/1	2/2	6/6	10/14	20/28	4/4		42/55	⊙	-87.544	$5/2^+$	9.60
		98		2/2	5/7	12/12	18/30	5/5		42/56	○	-88.115	0^+	24.10***
		100		2/2	6/6	10/14	18/30	6/6		42/58	○	-86.189	0^+	9.60
Tc	43													

* ${}^{88}_{38}\mathrm{Sr}_{50}$ and ${}^{89}_{39}\mathrm{Y}_{50}$ show that the *p*/*n*=20/28 is a stable *p*/*n* combination on the 5th shell .The element Y has only one stable nuclide ${}^{89}_{39}\mathrm{Y}_{50}$.the filling level of the isotope ${}^{88}_{38}\mathrm{Sr}_{50}$ of element is 82.6,for lower than other isotopes, showing that ${}^{88}_{38}\mathrm{Sr}_{50}$ and ${}^{89}_{39}\mathrm{Y}_{50}$ are 5-shelled nuclides of even *A* and odd *A*. Their stability depends on the outside-shell *p*/*n*=20/28.That is to say, it depends on "the magic numbers"20, 28 instead of "magic number"50.

** ${}^{90}_{40}\mathrm{Zr}_{50}$ and ${}^{91}_{40}\mathrm{Zr}_{51}$ show the structural characteristics of the 6th shell.

*** ${}^{94}_{40}\mathrm{Zr}_{54}$ and ${}^{98}_{42}\mathrm{Mo}_{56}$ show that *p*/*n*=18/30 is a stable combination of the 5th shell *p*/*n*.

**** ${}^{93}_{41}\mathrm{Nb}_{52}$ Shows that the nuclides who alternate between "full-filled" and "unfulfilled" in the two kinds of l and $\square p/n$ enjoy a high filling level. Most of the nuclides bear such a feature.

Ru		44	96		2/2	6/6	12/12	20/28	4/4		44/52	○	-86.075	0^+	5.50

Shell Structure of Stable Nuclides

Nuclide	Z	A	Shell Structure of Nucleon (*p/n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	Fulling Level (%)
			1	2	3	4	5	6	7					
		98		2/2	5/7	12/12	20/28	5/5		44/54	○	-88.226	0^+	1.86
		99	/1	2/2	5/7	12/12	20/28	5/5		44/55	⊙	-87.620	$5/2^+$	12.70
		100		2/2	6/6	10/14	20/28	6/6		44/56	○	-89.222	0^+	12.60
		101	/1	2/2	6/6	10/14	20/28	6/6		44/57	⊙	-87.952	$5/2^+$	17.0
		102		2/2	5/7	12/12	18/30	7/7		44/58	○	-89.100	0^+	31.60
		104		2/2	6/6	10/14	18/30	8/8		44/60	○	-88.099	0^+	18.70
Rh	45	103	/1	2/2	6/6	10/14	20/28	7/7		45/58	⊙	-88.024	$1/2^-$	100.0
Pd	46	102		2/2	5/7	12/12	20/28	7/7		46/56	○	-87.925	0^+	1.0
		104		2/2	6/6	10/14	20/28	8/8		46/58	○	-89.400	0^+	11.0
		105	/1	2/2	6/6	10/14	20/28	8/8		46/59	⊙	-88.422	$5/2^+$	22.20
		106		2/2	5/7	12/12	18/30	9/9		46/60	○	-89.913	0^+	27.30
		108		2/2	6/6	10/14	18/30	10/10		46/62	○	-89.523	0^+	26.70
		110		2/2	5/7	10/14	18/30	11/11		46/64	○	-88.335	0^+	11.80
Ag	47	107	/1	2/2	6/6	10/14	20/28	9/9		47/60	⊙	-88.404	$1/2^-$	51.83
		109	/1	2/2	5/7	12/12	18/30	10/10		47/62	⊙	-88.722	$1/2^-$	48.17
Cd	48	106		2/2	5/7	12/12	20/28	9/9		48/58	○	-87.131	0^+	1.25
		108		2/2	6/6	10/14	20/28	10/10		48/60	○	-89.251	0^+	0.89
		110		2/2	5/7	12/12	18/30	11/11		48/62	○	-90.349	0^+	12.50
		111	/1	2/2	5/7	12/12	18/30	11/11		48/63	⊙	-89.254	$1/2^+$	12.80
		112		2/2	6/6	10/14	18/30	12/12		48/64	○	-90.578	0^+	24.10
		113	/1	2/2	6/6	10/14	18/30	12/12		48/65	⊙	-89.050	$1/2^+$	12.20
		114		2/2	5/7	10/14	18/30	13/13		48/66	○	-90.020	0^+	28.70
		116		2/2	6/6	10/14	18/30	12/16		48/68	○	-88.718	0^+	7.50*
	49	113	/1	2/2	5/7	12/12	18/30	12/12		49/64	⊙	-89.372	$9/2^+$	4.30
		115	/1	2/2	6/6	10/14	18/30	13/13		49/66	⊙	-89.541	$9/2^+$	95.70
Sn	50	112		2/2	6/6	10/14	20/28	12/12		50/62	○	-88.658	0^+	1.01
		114		2/2	5/7	12/12	18/30	13/13		50/64	○	-90.560	0^+	0.67
		115	/1	2/2	5/7	12/12	18/30	13/13		50/65	⊙	90.035	$1/2^+$	0.38
		116		2/2	6/6	10/14	18/30	14/14		50/66	○	-91.526	0^+	14.60
		117	/1	2/2	6/6	10/14	18/30	14/14		50/67	⊙	-90.399	$1/2^+$	7.75
		118		2/2	5/7	10/14	18/30	15/15		50/68	○	-91.654	0^+	24.30
		119	/1	2/2	5/7	10/14	18/30	15/15		50/69	⊙	-90.067	$1/2^+$	8.60
		120		2/2	6/6	10/14	18/30	14/18		50/70	○	-91.102	0^+	32.4

*In the stable nuclides whose *p/n*"s on outside shells do not equal 1, the nucleons of all shells are mostly even-even combinations, except for the first shell.

	122		2/2	6/6	10/14	18/30	14/20		50/72	○	-89.946	0^+	4.56	

Shell Structure of Stable Nuclides

Nuclide	Z	A	Shell Structure of Nucleon (*p*/*n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	Fulling Level (%)
			1	2	3	4	5	6	7					
		124		2/2	6/6	10/14	18/30	14/22		50/74	○	-88.240	0^+	5.64
Sb	51	121	/1	2/2	5/7	10/14	18/30	16/16		51/70	⊙	-89.588	$5/2^+$	57.30
		123	/1	2/2	5/7	12/12	18/30	14/20		51/72	⊙	-89.218	$5/2^+$	42.70
Te	52	120		2/2	6/6	10/14	18/30	16/16		52/68	○	-89.404	0^+	0.091
		122		2/2	5/7	10/14	18/30	17/17		52/70	○	-90.304	0^+	2.50
		123	/1	2/2	5/7	10/14	18/30	17/17		52/71	⊙	-89.166	$1/2^+$	0.89
		124		2/2	6/6	10/14	18/30	16/20		52/72	○	-90.518	0^+	4.60
		125	/1	2/2	6/6	10/14	18/30	16/20		52/73	⊙	-89.019	$1/2^+$	7.0
		126		2/2	6/6	10/14	18/30	16/22		52/74	○	-90.066	0^+	18.70
		128		2/2	6/6	10/14	18/30	16/24		52/76	○	-88.992	0^+	31.70
		130		2/2	6/6	10/14	18/30	16/26		52/78	○	-87.348	0^+	34.50
I	53	127	/1	2/2	5/7	12/12	18/30	16/22		53/74	⊙	-88.980	$5/2^+$	100.0
Xe	54	124		2/2	6/6	10/14	18/30	18/18		54/70	○	-87.45	0^+	0.096
		126		2/2	5/7	10/14	18/30	19/19		54/72	○	-89.162	0^{+-}	0.090
		128		2/2	6/6	10/14	18/30	18/22		54/74	○	-89.861	0^+	1.92
		129	/1	2/2	6/6	10/14	18/30	18/22		54/75	⊙	-88.698	$1/2^+$	26.40
		130		2/2	6/6	10/14	18/30	18/24		54/76	○	-89.881	0^+	4.10
		131	/1	2/2	6/6	10/14	18/30	18/24		54/77	⊙	-88.421	$3/2^+$	21.20
		132		2/2	6/6	10/14	18/30	18/26		54/78	○	-89.286	0^+	26.90
		134	/1	2/2	6/6	10/14	18/30	18/28		54/80	○	-88.125	0^+	10.40
		136		2/2	6/6	10/14	18/30	18/30		54/82	○	-86.425	0^+	8.90
Cs	55	133	/1	2/2	5/7	12/12	18/30	18/26		55/78	⊙	-88.089	$7/2^+$	100.0
Ba	56	130		2/2	5/7	10/14	18/30	21/21		56/74	○	-87.303	0^+	0.106
		132		2/2	6/6	10/14	20/28	18/26		56/76	○	-88.453	0^+	0.101
		134		2/2	6/6	10/14	18/30	20/26		56/78	○	-88.968	0^+	2.42
		135	/1	2/2	6/6	10/14	18/30	20/26		56/79	⊙	-87.870	$3/2^+$	6.59
		136		2/2	6/6	10/14	18/30	20/28		56/80	○	-88.906	0^+	7.85
		137	/1	2/2	6/6	10/14	18/30	20/28		56/81	⊙	-87.733	$3/2^+$	11.20
		138		2/2	6/6	10/14	18/30	20/30		56/82	○	-88.273	0^+	71.70
La	57	138		2/2	5/7	12/12	18/30	20/30		57/81	○	-86.524	5^+	0.089
		139	/1	2/2	5/7	12/12	18/30	20/30		57/82	⊙	-87.231	$7/2^+$	99.911
Ce	58	136		2/2	6/6	10/14	20/28	20/28		58/78	○	-86.50	0^+	0.19
		138		2/2	6/6	10/14	18/30	22/28		58/80	○	-87.565	0^+	0.254
		140		2/2	6/6	10/14	18/30	22/30		58/82	○	-88.081	0^+	88.5
		142		2/2	6/6	10/14	18/30	22/32		58/84	○	-84.535	0^+	11.1
Pr	59	141	/1	2/2	5/7	12/12	18/30	22/30		59/82	⊙	-86.018	$5/2^+$	100.0

Shell Structure of Stable Nuclides

Nuclide	Z	A	Shell Structure of Nucleon (*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	Fulling Level (%)
Nd	60	142	2/2	6/6	10/14	18/30	24/30			60/82	○	-85.949	0^+	27.2
		143 /1	2/2	6/6	10/14	18/30	24/30			60/83	⊙	-84.000	$7/2^-$	12.2
		144	2/2	6/6	10/14	18/30	24/32			60/84	○	-83.746	0^+	23.8
		145 /1	2/2	6/6	10/14	18/30	24/32			60/85	⊙	-81.430	$7/2^-$	8.3
		146	2/2	6/6	10/14	18/30	24/34			60/86	○	-80.923	0^+	17.2
		148	2/2	6/6	10/14	18/30	24/36			60/88	○	-77.407	0^+	5.7
		150	2/2	6/6	10/14	18/30	24/38			60/90	○	-73.682	0^+	5.6
Pm	61													
Sm	62	144	2/2	6/6	10/14	20/28	24/32			62/82	○	-81.964	0^+	3.1
		147 /1	2/2	6/6	10/14	20/28	24/34			62/85	⊙	-79.265	$7/2^-$	15.1
		148	2/2	6/6	10/14	20/28	24/36			62/86	○	-79.335	0^+	11.3
		149 /1	2/2	6/6	10/14	20/28	24/36			62/87	⊙	-77.135	$7/2^-$	13.9
		150	2/2	6/6	10/14	18/30	26/36			62/88	○	-77.049	0^+	7.4
		152	2/2	6/6	10/14	18/30	26/38			62/90	○	-74.761	0^+	26.6
		154	2/2	6/6	10/14	18/30	26/40			62.92	○	-72.454	0^+	22.6
Eu	63	151 /1	2/2	5/7	12/12	18/30	26/36			63/88	⊙	-74.650	$5/2^+$	47.9
		153 /1	2/2	5/7	12/12	18/30	26/38			63/90	⊙	-73.363	$5/2^+$	52.1
Cd	64	152	2/2	6/6	10/14	18/30	28/36			64/88	○	-74.703	0^+	0.20
		154	2/2	6/6	10/14	18/30	28/38			64/90	○	-73.704	0^+	2.1
		155 /1	2/2	6/6	10/14	18/30	28/38			64/91	⊙	-72.071	$3/2^-$	14.8
		156	2/2	6/6	10/14	18/30	28/40			64/92	○	-72.536	0^+	26.6
		157 /1	2/2	6/6	10/14	18/30	28/40			64/93	⊙	-70.071	$3/2^-$	15.7
		158	2/2	6/6	10/14	18/30	28/42			64/94	○	-70.691	0^+	24.8
		160	2/2	6/6	10/14	20/28	26/46			64/96	○	-67.943	0^+	21.8*
Tb	65	159 /1	2/2	5/7	12/12	18/30	28/42			65/94	⊙	-69.536	$3/2^+$	100.0
Dy	66	156	2/2	6/6	10/14	20/28	28/40			66/90	○	-70.527	0^+	0.057
		158	2/2	6/6	10/14	20/28	28/42			66/92	○	-70.410	0^+	0.10
		160	2/2	6/6	10/14	20/28	28/44			66/94	○	-69.674	0^+	2.3**
		161 /1	2/2	6/6	10/14	20/28	28/44			66/95	⊙	-68.056	$5/2^+$	19.09

* $^{160}_{64}Gd_{96}$ Shows that *p/n* =26/46 is a stable combination of the full-filled shell *p/n*'s on the 6th shell.

** $^{160}_{66}Dy_{94}$ Shows that *p/n* =28/44 is a stable combination of the full-filled shell *p/n*'s on the 6th shell.The neighboring shells exchange nucleons instantly. The *p/n*'s of the 4th and 5th shells fluctuate between *p/n* =10/14, *p/n* = 20/28 and *p/n* =18/30. But the quasi-full filled combinations on inside shells do not affect the stability of nuclides.

	162	2/2	5/7	12/12	18/30	28/44	1/1	66/96	○	-68.181	0^+	25.5
	163 /1	2/2	5/7	12/12	18/30	28/44	1/1	66/97	⊙	-66.382	$5/2^-$	24.9
	164	2/2	6/6	10/14	18/30	28/44	2/2	66/98	○	-65.967	0^+	28.1

Shell Structure of Stable Nuclides

Nuclide	Z	A	Shell Structure of Nucleon (*p/n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	Fulling Level (%)
			1	2	3	4	5	6	7					
Ho	67	165	/1	2/2	5/7	12/12	18/30	28/44	2/2	67/98	⊙	-64。896	$7/2^-$	100.0
Er	68	162		2/2	5/7	12/12	20/28	28/44	1/1	68/94	○	-66.335	0^+	0.14*
		164		2/2	6/6	10/14	20/28	28/44	2/2	68/96	○	-65.940	0^+	1.56
		166		2/2	5/7	12/12	18/30	28/44	3/3	68/98	○	-64.921	0^+	33.4
		167	/1	2/2	5/7	12/12	18/30	28/44	3/3	68/99	⊙	-63.286	$7/2^+$	22.9
		168		2/2	6/6	10/14	18/30	28/44	4/4	68/100	○	-62.985	0^+	27.1
		170		2/2	5/7	12/12	18/30	26/46	5/5	68/102	○	-60.104	0^+	14.9
Tm	69	169	/1	2/2	5/7	12/12	18/30	28/44	4/4	69/100	⊙	-61.269	$1/2^+$	100.0
Yb	70	168		2/2	6/6	10/14	20/28	28/44	5/5	70/98	○	-61.565	0^+	0.135
		170		2/2	5/7	12/12	18/30	28/44	5/5	70/100	○	-60.759	0^+	3.1
		171	/1	2/2	5/7	12/12	18/30	28/44	6/6	70/101	⊙	-59.302	$1/2^-$	14.4
		172		2/2	6/6	10/14	18/30	28/44	6/6	70/102	○	-59.250	0^+	21.9
		173	/1	2/2	6/6	10/14	18/30	28/44	6/6	70/103	⊙	-57.546	$5/2^-$	16.2
		174		2/2	5/7	12/12	18/30	26/46	7/7	70/104	○	-56.940	0^+	31.6
		176		2/2	6/6	10/14	18/30	26/46	8/8	70/106	○	-53.490	0^+	12.6
Lu	71	175	/1	2/2	6/6	10/14	18/30	28/44	7/7	71/104	⊙	-55.159	$7/2^+$	97.39
		176		2/2	5/7	12/12	18/30	26/46	8/8	71/105	○	-53.381	7^-	2.61
Hf	72	174		2/2	5/7	12/12	18/30	28/44	7/7	72/102	○	-55.830	0^+	0.16
		176		2/2	6/6	10/14	18/30	28/44	8/8	72/104	○	-54.567	0^+	5.2
		177	/1	2/2	6/6	10/14	18/30	28/44	8/8	72/105	⊙	-52.879	$7/2^-$	18.6
		178		2/2	5/7	12/12	18/30	26/46	9/9	72/106	○	-52.434	0^+	27.1
		179	/1	2/2	5/7	12/12	18/30	26/46	9/9	72/107	⊙	-50.462	$9/2^+$	13.7
		180		2/2	6/6	10/14	18/30	26/46	10/10	72/108	○	-49.779	0^+	35.2
Ta	73	180		2/2	5/7	12/12	18/30	26/46	10/10	73/107	○	-48.941	1^+	0.0123
		181	/1	2/2	5/7	12/12	18/30	26/46	10/10	73/108	⊙	-48.425	$7/2^+$	99.9877
W	74	180		2/2	6/6	10/14	18/30	28/44	10/10	74/106	○	-49.624	0^+	0.13
		182		2/2	5/7	12/12	18/30	26/46	11/11	74/108	○	-48.228	0^+	26.3
		183	/1	2/2	5/7	12/12	18/30	26/46	11/11	74/109	⊙	46.347	$1/2^-$	14.3
		184		2/2	6/6	10/14	18/30	26/46	12/12	74/110	○	-45.687	0^+	30.7
		186		2/2	5/7	10/14	18/30	26/46	13/13	74/112	○	-42.498	0^+	28.6
Re	75	185	/1	2/2	5/7	12/12	18/30	26/46	12/12	75/110	⊙	-43.802	$5/2^+$	37.40
		187	/1	2/2	6/6	10/14	18/30	26/46	13/13	75/112	⊙	-41.205	$5/2^+$	62.60
Os	76	184		2/2	6/6	10/14	18/30	28/44	12/12	76/108	○	-44.233	0^+	0.018
		186		2/2	5/7	12/12	18/30	26/46	13/13	76/110	○	-42.987	0^+	1.6

Shell Structure of Stable Nuclides.

Nuclide	Z	A	Shell Structure of Nucleon(p/n) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ MeV)	1^{π}	Fulling Level (%)
		187 /1	2/2	5/7	12/12	18/30	26/46	13/13	76/111	⊙	-41.208	$1/2^-$	1.6
		188	2/2	6/6	10/14	18/30	26/46	14/14	76/112	○	-41.125	0^+	13.3
		189 /1	2/2	6/6	10/14	18/30	26/46	14/14	76/113	⊙	-38.978	$3/2^-$	16.1
		190	2/2	5/7	10/14	18/30	26/46	15/15	76/114	○	-38.699	0^+	26.4
		192	2/2	6/6	10/14	18/30	26/46	14/18	76/116	○	-35.875	0^+	41.0
Ir	77	191 /1	2/2	6/6	10/14	18/30	26/46	15/15	77/114	⊙	-36.698	$3/2^+$	37.3
		193 /1	2/2	5/7	10/14	18/30	26/46	16/16	77/116	⊙	-34.519	$3/2^+$	62.7
Pt	78	190	2/2	5/7	10/14	18/30	26/46	15/15	78/112	○	-37.318	0^+	0.013
		192	2/2	6/6	10/14	18/30	26/46	16/16	78/114	○	-36.283	0^+	0.78
		194	2/2	5/7	10/14	18/30	26/46	17/17	78/116	○	-34.765	0^+	32.9
		195 /1	2/2	5/7	10/14	18/30	26/46	17/17	78/117	⊙	-32.802	$1/2^-$	33.8
		196	2/2	6/6	10/14	18/30	26/46	16/20	78/118	○	-32.652	0^+	25.3
		198	2/2	6/6	10/14	18/30	26/46	16/22	78/120	○	-29.921	0^+	7.2
Au	79	197 /1	2/2	5/7	10/14	18/30	26/46	18/18	79/118	⊙	-31.150	$3/2^+$	100.0
Hg	80	196	2/2	6/6	10/14	18/30	26/46	18/18	80/116	○	-31.846	0^+	0.15
		198	2/2	5/7	10/14	18/30	26/46	19/19	80/118	○	-30.964	0^+	10.0
		199 /1	2/2	5/7	10/14	18/30	26/46	19/19	80/119	⊙	-29.557	$1/2^-$	16.8
		200	2/2	6/6	10/14	20/28	26/46	16/24	80/120	○	-29.514	0^+	23.1
		201	2/2	6/6	10/14	20/28	26/46	16/24	80/121	⊙	-27.672	$3/2^-$	13.2
		202	2/2	6/6	10/14	18/30	26/46	28/24	80/122	○	-27.356	0^+	29.8
		204	2/2	6/6	10/14	18/30	26/46	18/26	80/124	○	-24.703	0^+	6.9
Tl	81	203 /1	2/2	5/7	12/12	18/30	26/46	18/24	81/122	⊙	-25.769	$1/2^+$	29.5
		205 /1	2/2	5/7	12/12	18/30	26/46	18/26	81/124	⊙	-23.837	$1/2^+$	70.5
Pb	82	204	2/2	6/6	10/14	18/30	28/44	18/26	82/122	○	-25.117	0^+	1.42
		206	2/2	6/6	10/14	18/30	28/44	18/28	82/124	○	-23.795	0^+	24.1
		207 /1	2/2	6/6	10/14	18/30	28/44	18/28	82/125	⊙	-22.463	$1/2^-$	22.1
		208	2/2	6/6	10/14	18/30	28/44	18/30	82/126	○	-21.759	0^+	52.3
Bi	83	209 /1	2/2	5/7	12/12	18/30	26/46	20/28	83/126	⊙	-18.268	$9/2^-$	100.0*
Po	84												
At	85												
Rn	86												

* $^{209}_{83}Bi_{126}$ is a stable nuclide and the *p/n* of the outside shell is *p/n* =20/28. The specific value of *p/n* =5/7, *p/n* =10/14, *p/n* =20/28 is 1/1.4 and it a stable combination. The number of neutrons of this nuclide is *n*=126 and its stability does not depend on "the magic number"126, but on the marching of filling level between shells. So is. $^{208}_{82}Pd_{126}$. The outside shell *p/n*'s are *p/n* =20/28 and *p/n* =18/30, which happen to be the 2 stable combinations of the full-filled shell *p/n*'s on the 5th shell.

Fr	87

Shell Structure of Stable Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	Fulling Level (%)
			1	2	3	4	5	6	7					
Ra	88													
Ac	89													
Th	90	232		2/2	6/6	10/14	20/28	26/46	26/46	90/142	○	35.447	0^{+}	100.0*
U	92	235	/1	2/2	6/6	10/14	20/28	26/46	28/46	92/143	⊙	40.916	$7/2^{-}$	0.720
		238		2/2	6/6	10/14	20/28	26/46	28/50	92/146	○	47.307	0^{+}	99.275**

* $^{232}_{90}Th_{142}$ is a stable nuclide and its outside shell *p/n* is *p/n*=26/46, identical with the full-filled shelled shell *p/n*'son the 6^{th} shell.

** $^{238}_{92}U_{146}$ is the heaviest stable nuclide in the natural world. Its outside shell *p/n* is *p/n*=28/50 and its protons and neutrons are all "magic number". However, the nuclide stability do not depend on such "magic numbers" as 28, 50, but on the *p/n* combinations on outside shells and the matching of filling levels between shells.

Notes:

① The funds mental date of the table comefrom: V.S.Shirley et al, Nuclear Wallet Cards, 1979 K.S.Krane, Introductory Nuclear Physics, 1987 [8].

② The fundamental data of the table come from: Nuclear Physics, P390~P405, Xu Side, published by Qinghua university Press, 1992 [9].

Table II: Shell Structure of Nuclides ①②③④⑤

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	Fulling Level (%)
N	0	1										8.071	$1/2^+$	10.6min(β^-)
H	1	1	1/							1/		7.289	$1/2^+$	99.985%
		2	1/	/1						1/1		13.136	1^+	0.015%
		3	1/	/2						1/2		14.950	$1/2^+$	12.3y(β^-)
He	2	3	1/	1/1						2/1		14.931	$1/2^+$	1.38×10^{-4}%
		4		2/2						2/2	○	2.425	0^+	99.99986%*
Li	3	6		2/2	1/1					3/3	○	14.087	1^+	7.5%
		7	/1	2/2	1/1					3/4	⊙	14.908	$3/2^-$	92.5%
		8		2/2	1/3					3/5	○	20.947	2^+	0.84s(β)**
Be	4	7	/1	2/2	2/					4/3	⊙	15.770	$3/2^-$	53.3d(ε)
		8		2/2	2/2					4/4	○	4.942	0^+	0.07fs(α)***
		9	/1	2/2	2/2					4/5	⊙	11.348	$3/2^-$	100%
		10		2/2	2/4					4/6	○	12.608	0^+	1.6×10^6y(β^-)
		11	/1	2/2	2/4					4/7	⊙	20.176	$1/2^+$	13.8s(β^-)
B	5	8		2/2	3/1					5/3	○	22.922	2^+	0.77s(ε)
		9	/1	2/2	3/1					5/4	⊙	12.416	$3/2^-$	0.85as(α)****
		10		2/2	3/3					5/5	○	12.052	3^+	19.8%
		11	/1	2/2	3/3					5/6	⊙	8.668	$3/2^-$	80.2%
		12		2/2	3/5					5/7	○	13.370	1^+	20.4ms(β^-)
		13	/1	2/2	3/5					5/8	⊙	16.562	$3/2^-$	17.4ms(β^-)
C	6	9	/1	2/2	4/					6/3	⊙	28.912	$3/2^-$	0.13s(ε)****
		10		2/2	4/2					6/4	○	15.703	0^+	19.2s(ε)****
		11	/1	2/2	4/2					6/5	⊙	10.650	$3/2^-$	20.4min(ε)
		12		2/2	4/4					6/6	○	0	0^+	98.89%
		13	/1	2/2	4/4					6/7	⊙	3.125	$1/2^-$	1.11%

* ${}^4_2He_2$ is a 2–shelled full-filled nuclide with its *p/n* being 2/2. The *p/n* on 2nd full-filled shell has only one combination.

**It is an important characteristic of a stable nuclide for the *p/n* on outside shells to be equal to one. The nuclides of $n-p$ =2, 4, 6 …decay in the way of (β^-) radiation.

*** ${}^8_4Be_4$ is a 3-shelled non-full-filled nuclide with its *p/n* being 2/2 and decays in (α) style.

**** From is structure,we know that ${}^9_5B_4$ decays in (ε) style. In the original table it was listed as a nuclide which decays in (α) style, which should be deemed as the second decay after it's (ε) style of decay.

****The nuclides of $p-n$ =2, 4, 6…decay in (ε) style. ${}^{10}_6C_4$ decays into the stable nuclide ${}^{10}_5B_5$ after absorbing an electron.

****The nuclides of p-n =4, 6…become stable after more than two decays in (ε) style, e.g. the nuclide ${}^9_6C_3$ decays in this procedure: ${}^9_6C_3 + e \rightarrow {}^9_5B_4 + e \rightarrow {}^9_5Be_5$

		14		2/2	4/6				6/8	○	3.020	0^+	5730y(β^-)
		15	/1	2/2	4/6				6/9	⊙	9.873	$1/2^+$	2.45s(β^-)
N	7	12		2/2	5/3				7/5	○	17.338	1^+	11ms(ε)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon (*p/n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	$T_{1/2}$
			1	2	3	4	5	6	7					
		13	/1	2/2	5/3					7/6	⊙	5.346	$1/2^-$	9.96min(ε)
		14		2/2	5/5					7/7	○	2.863	1^+	99.63%
		15	/1	2/2	5/5					7/8	⊙	0.102	$1/2^-$	0.366%
		16		2/2	5/7					7/9	○	5.682	2^-	7.13s(β^-)
		17	/1	2/2	5/7					7/10	⊙	7.870	$1/2^-$	4.17s(β^-)
		18		2/2	5/7	/2				7/11	○	13.274	1^-	0.63s(β^-)
O	8	14		2/2	6/4					8/6	○	8.008	0^+	71s(ε)
		15	/1	2/2	6/4					8/7	⊙	2.855	$1/2^-$	122s(ε)
		16		2/2	6/6					8/8	○	-4.737	0^+	99.76%
		17	/1	2/2	6/6					8/9	⊙	-0.810	$5/2^+$	0.038%
		18		2/*2	5/7	1/1				8/10	○	-0.783	0^+	0.204%**
		19	/1	2/2	6/6	/2				8/11	⊙	3.331	$5/2^+$	26.9s(β^-)
		20		2/2	5/7	1/3				8/12	○	3.799	0^+	13.5s(β^-)
F	9	17	/1	2/2	5/5	2/				9/8	⊙	1.952	$5/2^+$	64.5s
		18		2/2	5/7	2/				9/9	○	0.872	1^+	110min
		19	/1	2/2	6/6	1/1				9/10	⊙	-1.487	$1/2^+$	100%
		20		2/2	6/6	1/3				9/11	○	-0.017	2^+	11s(β^-)
		21	/1	2/2	6/6	1/3				9/12	⊙	-0.047	$5/2^+$	4.3s(β^-)
		22		2/2	5/7	2/4				9/13	○	2.826	$(3,4)^+$	4.2s(β^-)
		23	/1	2/2	5/7	2/4				9/14	⊙	3.35	$(3/2,5/2)^+$	2.2s(β^-)
Ne	10	17	/1	2/2	6/4	2/				10/7	⊙	16.478	$1/2^-$	0.11s(ε)***
		18		2/2	6/6	2/				10/8	○	5.319	0^+	1.7s(ε)
		19	/1	2/2	6/6	2/				10/9	⊙	1.751	$1/2^+$	17.3s(ε)
		20		2/2	6/6	2/2				10/10	○	-7.043	0^+	90.51%
		21	/1	2/2	6/6	2/2				10/11	⊙	-5.733	$3/2^+$	0.27%
		22		2/2	5/7	3/3				10/12	○	-8.026	0^+	9.22%
		23	/1	2/2	6/6	2/4				10/13	⊙	-5.155	$5/2^+$	37.6s(β^-)
		24		2/2	5/7	3/5				10/14	○	-5.949	0^+	3.4min(β^-)
		25	/1	2/2	5/7	3/5				10/15	⊙	-2.15	$(1/2,3/2)^+$	0.60s(β^-)
Na	11	20		2/2	6/6	3/1				11/9	○	6.844	2^+	0.45s(ε)
		21	/1	2/2	6/6	3/1				11/10	⊙	-2.186	$3/2^+$	22.5s(ε)
		22		2/2	5/7	4/2				11/11	○	-5.184	3^+	2.60y(ε)

* ${}^{16}_{8}O_8$ is a 3-shelled nuclide with full-filled shells, with its *p/n* on the 3rd shell being 6/6. We know from the Table of Development Route of Nuclides that *p/n*=6/6 is a relatively stable combination of full-filled *p/n* on the 3rd shell.

**Although there is such a nuclide as one whose *p/n* is 5/7 when the 3rd shell is the most outside, *p/n*=5/7 is a combination when the 3rd shell is inside. Such stable nuclide as Ne_{12}, Si_{16} and S_{18} all indicate that *p/n*=5/7 is a combination when the 3rd shell is full-filled.

***Restricted by the proton number p≤6 of the 3rd shell, the two extra protons line on the 4th shell. After two (ε)decays,they form the 3-shelled nuclide ${}^{17}_{8}O_9$.

Shell Structure of Nuclides①②

Nuclide	Z	A	Shell Structure of Nucleon(p/n) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	$T_{1/2}$
		23	/1	2/2	6/6	3/3				11/12	⊙	-9.530	$3/2^+$	100%
		24		2/2	6/6	3/5				11/13	○	-8.418	4^+	15.0h(β^-)
		25	/1	2/2	6/6	3/5				11/14	⊙	-9.375	$5/2^+$	60s(β^-)
		26		2/2	5/7	4/6				11/15	○	-6.888	3^+	1.1s(β^-)
		27	/1	2/2	5/7	4/6				11/16	⊙	-5.63	$5/2^+$	0.30s(β^-)
Mg	12	21	/1	2/2	6/6	4/				12/9	⊙	10.912	$(3/2,5/2)^+$	0.123s(ε)
		22		2/2	6/6	4/2				12/10	○	-0.394	0^+	3.86s(ε)
		23	/1	2/2	6/6	4/2				12/11	⊙	-5.471	$3/2^+$	11.3s(ε)
		24		2/2	6/6	4/4				12/12	○	-13.931	0^+	78.99%*
		25	/1	2/2	6/6	4/4				12/13	⊙	-13.191	$5/2^+$	10.00%
		26		2/2	5/7	5/5				12/14	○	-16.212	0^+	11.01%
		27	/1	2/2	6/6	4/6				12/15	⊙	-14.585	$1/2^+$	9.46min(β^-)
		28		2/2	5/7	5/7				12/16	○	-15.016	0^+	21.0h(β^-)
		29	/1	2/2	5/7	5/7				12/17	⊙	-38.405	$3/2^+$	1.4s(β^-)
A1	13	24		2/2	6/6	5/3				13/11	○	-0.052	4^+	2.07s(ε)
		25	/1	2/2	6/6	5/3				13/12	⊙	-8.913	$5/2^+$	7.18s(ε)
		26		2/2	5/7	6/4				13/13	○	-12.208	5^+	0.72My(ε)
		27	/1	2/2	6/6	5/5				13/14	⊙	-17.194	$5/2^+$	100%
		28		2/2	6/6	5/7				13/15	○	-16.848	3^+	2.24min(β^-)
		29	/1	2/2	6/6	5/7				13/16	⊙	-18.212	$5/2^+$	6.6min(β^-)
		30		2/2	5/7	6/8				13/17	○	-15.89	3^+	3.7s(β^-)
Si	14	26		2/2	6/6	6/4				14/12	○	-7.143	0^+	2.21s(ε)

* ${}^{24}_{12}Mg_{12}$ is a stable nuclide with *p/n*=4/4 on outside shells, but ${}^{24}_{11}Al_{11}$ are all nustable. After decay, the *p/n* on outside shells of ${}^{24}_{11}Na_{13}$ is equal to 4/4.For ${}^{24}_{13}Al_{11}$, after (ε) decay, the *p/n*=4/4 on outside shells. They all become stable ${}^{24}_{12}Mg_{12}$ after decay. The same nuclides whose proton numbers are next to each others are next to each other, mostly bear this characteristic, such as ${}^{20}_{10}Ne_{10}$, ${}^{23}_{11}Na_{12}$, etc.

		27	/1	2/2	6/6	6/4		14/13	⊙	-12.385	$5/2^+$	4.13s(ε)
		28		2/2	6/6	6/6		14/14	○	-21.491	0^+	92.23%
		29	/1	2/2	6/6	6/6		14/15	⊙	-21.894	$1/2^+$	4.67%
		30		2/2	5/7	7/7		14/16	○	-24.432	0^+	3.10%
		31	/1	2/2	6/6	6/8		14/17	⊙	-22.949	$3/2^+$	2.62h(β^-)
		32		2/2	5/7	7/9		14/18	○	-24.092	0^+	105y(β^-)
		33	/1	2/2	5/7	7/9		14/19	⊙	-20.57	$(3/2)^+$	6.2s(β^-)
p	15	29	/1	2/2	6/6	7/5		15/14	⊙	-16.949	$1/2^+$	4.1s(ε)
		30		2/2	6/6	8/6		15/15	○	-20.204	1^+	2.50min(ε)
		31	/1	2/2	6/6	7/7		15/16	⊙	-24.440	$1/2^+$	100%
		32		2/2	6/6	7/9		15/17	○	-24.305	1^+	14.3d(β^-)
		33	/1	2/2	6/6	7/9		15/18	⊙	-26.337	$1/2^+$	25.3d(β^-)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	$T_{1/2}$
		34		2/2	5/7	8/10				15/19	○	-24.55	1^+	12.4s(β^-)
S	16	30		2/2	6/6	8/6				16/14	○	-14.062	0^+	1.2s(ε)
		31	/1	2/2	6/6	8/6				16/15	⊙	-19.044	$1/2^+$	2.6s(ε)
		32		2/2	6/6	8/8				16/16	○	-26.015	0^+	95.02%
		33	/1	2/2	6/6	8/8				16/17	⊙	-26.586	$3/2^+$	0.75%
		34		2/2	5/7	9/9				16/18	○	-29.931	0^+	4.21%
		35	/1	2/2	6/6	8/10				16/19	⊙	-28.846	$3/2^+$	87.4d(β^-)
		36		2/2	6/6	8/12				16/20	○	-30.666	0^+	0.017%*
		37	/1	2/2	5/7	9/11				16/21	⊙	-26.908	$7/2^-$	5.0min(β^-)
		38		2/2	5/7	9/13				16/22	○	-26.862	0^+	170min(β^-)
Cl	17	33	/1	2/2	6/6	9/7				17/16	⊙	-21.003	$3/2^+$	2.51s(ε)
		34		2/2	5/7	10/8				17/17	○	-24.438	0^+	1.53s(ε)
		35	/1	2/2	6/6	9/9				17/18	⊙	-29.014	$3/2^+$	75.77%
		36		2/2	6/6	9/11				17/19	○	-29.522	2^+	3.0×10^5y(β^-)**
		37	/1	2/2	5/7	10/10				17/20	⊙	-31.762	$3/2^+$	24.23%

*When the protons are full, the *p/n* on outside shells of stable nuclides are not always equal to one, but $^{36}_{16}S_{20}$ shows that those nuclides in which nucleons on all shells are even-even combinations tend to be stable.

**Non-stable nuclides between two isotopes with high filling levels generally have two styles of decay, e.g. $^{36}_{17}Di_{19}$ with *p/n* =9/11 on outside shells. It decays into $^{36}_{16}S_{20}$ after absorbing on electron and decays into $^{36}_{18}Ar_{18}$ after discharging on electron, tending to be stable.

*** $^{40}_{18}Ar_{22}$ shows that *p/n* =10/14 is a stable *p/n* combination on the 4th full-filled shell.

**** $^{40}_{18}Ar_{24}$ is obviously a 5-shelled nuclide. Only when it is included into 5-shelled nuclides can the nuclide nature be reflected. Likewise, $^{40}_{19}K_{23}$ also shows the characteristics of a 5-shelled nuclide.

		38		2/2	5/7	10/12		17/21	○	-29.798	2^-	37.3min(β^-)
		39	/1	2/2	5/7	10/12		17/22	⊙	-29.803	$3/2^+$	56min(β^-)
		40		2/2	5/7	10/14		17/23	○	-27.54	2^-	1.35min(β^-)
		41	/1	2/2	5/7	10/14		17/24	⊙	-27.40	$(1/2,3/2)^+$	31s(β^-)
Ar	18	34		2/2	6/6	10/8		18/16	○	-18.379	0^+	0.844s(ε)
		35	/1	2/2	6/6	10/8		18/17	⊙	-23.049	$3/2^+$	1.78s(ε)
		36		2/2	6/6	10/10		18/18	○	-30.231	0^+	0.337%
		37	/1	2/2	5/7	11/9		18/19	⊙	-30.948	$3/2^+$	35.0d(ε)
		38		2/2	5/7	11/11		64/96	○	-34.715	0^+	0.063%
		39	/1	2/2	6/6	10/12		18/21	⊙	-33.241	$7/2^-$	269y(β^-)
		40		2/2	6/6	10/14		18/22	○	-35.040	0^+	99.6%***
		41	/1	2/2	5/7	11/13		18/23	⊙	-33.068	$7/2^-$	1.83h(β^-)
		42		2/2	6/6	10/14	/2	18/24	○	-34.42	0^+	33y(β^-)****
		43	/1	2/2	6/6	10/14	/2	18/25	⊙	-31.98		5.4min(β^-)
		44		2/2	6/6	10/14	1/3	18/26	○	-32.271	0^+	11.9min(β^-)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	$T_{1/2}$
			1	2	3	4	5	6	7					
K	19	37	/1	2/2	6/6	11/19				19/18	⊙	-24.799	$3/2^+$	1.23s (ε)
		38		2/2	5/7	12/10				19/19	○	-28.802	3^+	7.61min(ε)
		39	/1	2/2	6/6	11/11				19/20	⊙	-33.806	$3/2^+$	93.26%
		40		2/2	6/6	11/13				19/21	○	-33.535	4^-	1.28×10^9 (β^-)
		41	/1	2/2	5/7	12/12				19/22	⊙	-35.560	$3/2^+$	6.73%*
		42		2/2	5/7	12/12	/2			19/23	○	-35.023	2^-	12.4h(β^-)
		43	/1	2/2	5/7	12/12	/2			19/24	⊙	-36.588	$3/2^-$	22.3h(β^-)
		44		2/2	6/6	10/14	1/3			19/25	○	-35.807	2^-	22.1min(β^-)
		45	/1	2/2	6/6	10/14	1/3			19/26	⊙	-36.611	$3/2^+$	17min(β^-)
		46		2/2	5/7	10/14	2/4			19/27	○	-35.420	(2^-)	115s(β^-)
		47	/1	2/*2	5/7	10/14	2/4			19/28	⊙	-35.698	$1/2^+$	17.5s(β^-)
Ca	20	38		2/2	6/6	12/10				20/18	○	-22.060	0^+	0.44s (ε)
		39	/1	2/2	6/6	12/10				20/19	⊙	-27.282	$3/2^+$	0.86s(ε)
		40		2/2	6/6	12/12				20/20	○	-34.847	0^+	96.94%*
		41	/1	2/2	6/6	12/12				20/21	⊙	-35.138	$7/2^-$	1.0×10^5y(ε)**
		42		2/2	5/7	12/12	1/1			20/22	○	-38.544	0^+	0.647%
		43	/1	2/2	5/7	12/12	1/1			20/23	⊙	-38.405	$7/2^-$	0.135%
		44		2/2	6/6	10/14	2/2			20/24	○	-41.466	0^+	2.09%
		45	/1	2/2	5/7	12/12	1/3			20/25	⊙	-40.810	$7/2^-$	165d(β^-)
		46		2/2	5/7	10/14	3/3			20/26	○	-43.138	0^+	0.0035%

			47	/1	2/2	6/6	10/14	2/4	20/27	⊙	-42.343	$7/2^-$	4.54d(β^-)
			48		2/2	6/6	10/14	2/6	20/28	○	-44.216	0^-	0.187%***
			49	/1	2/2	5/7	10/14	3/5	20/29	⊙	-41.286	$3/2^-$	8.72min(β^-)
			50		2/2	5/7	10/14	3/7	20/30	○	-39.572	0^+	14s(β^-)****
Sc		21	42		2/2	5/7	12/12	2/	20/21	○	-32.121	0^+	0.68s(ε)
			43	/1	2/2	5/7	12/12	2/	21/22	⊙	-36.185	$7/2^-$	3.89h(ε)
			44		2/2	6/6	10/14	3/1	21/23	○	-37.811	2^+	3.93h(ε)
			45	/1	2/2	5/7	12/12	2/2	21/24	⊙	-41.066	$7/2^-$	100%
			46		2/2	5/7	12/12	2/4	21/25	○	-41.756	4^+	83.8d(β^-)
			47	/1	2/2	5/7	12/12	2/4	21/26	⊙	-44.330	$7/2^-$	3..35d(β^-)

* ${}^{41}_{19}K_{22}$ and ${}^{40}_{20}Ca_{20}$ show that *p/n*=12/12 is a stable combination of the 4th full-filled shell.

** ${}^{41}_{20}Ca_{21}$ show that the nuclide stability not merely depends on the outside shell structure. Both of ${}^{41}_{20}Ca_{21}$and ${}^{40}_{20}Ca_{20}$ have their outside shell *p/n* equal to 12/12,but their different structure categories makes different stability, ${}^{41}_{20}Ca_{21}$+e→ ${}^{41}_{19}K_{22}$,tending to be stable.

***The proton-neutron pairing is a fundamental pre-requisite for the forming of a stable nuclide. The remaining 4 neutrons, after the protons and neutrons pair on outside shell of ${}^{48}_{20}Ca_{28,}$ pair with the superfluous neutrons on inside shells. This show that nucleons of neighboring shells also may pair. The nuclides whose protons and neutrons of all shells are even numbered have a bigger tendency to be stable.

****The *p/n* of outside sheiis of ${}^{50}_{20}Ca_{30}$3/7.Such nuclides cannot become stable until after several (β^-) radiations. Their decay procedure is: ${}^{50}_{20}Ca_{30}$—e → ${}^{50}_{21}Sc_{29}$—e → ${}^{50}_{22}Ti_{28}$.There are many nuclide which decay in the similar way.

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon (*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	$T_{1/2}$
		48		2/2	6/6	10/14	3/5			21/27	○	-44.498	6^+	43.7h(β^-)
		49	/1	2/2	6/6	10/14	3/5			21/28	⊙	-46.555	$7/2^-$	57.0min(β^-)
		50		2/2	5/7	10/14	4/6			21/29	○	-44.539	5^+	1.71min(β^-)
Ti	22	43	/1	2/2	6/6	12/12	2/			22/21	⊙	-29.324	$7/2^-$	0.51s(ε)
		44		2/2	5/7	12/12	3/1			22/22	○	-37.546	0^+	54y(ε)
		45	/1	2/2	5/7	12/12	3/1			22/23	⊙	-39.004	$7/2^-$	3.09h(ε)
		46		2/2	5/7	12/12	3/3			22/24	○	-44.123	0^+	8.2%
		47	/1	2/2	5/7	12/12	3/3			22/25	⊙	-44.931	$5/2^-$	7.4%
		48		2/2	6/6	10/14	4/4			22/26	○	-48.488	0^+	73.7%
		49	/1	2/2	6/6	10/14	4/4			22/27	⊙	-48.559	7/2	5.4%
		50		2/*2	5/7	10/14	5/5			22/28	○	-51.432	0^+	5.2%
		51	/1	2/2	6/6	10/14	4/6			22/29	⊙	-49.733	$3/2^-$	5.80min(β^-)
		52		2/2	5/7	10/14	5/7			22/30	○	-49.469-	0^+	1.7min(β^-)
		53	/1	2/2	5/7	10/14	5/7			22/31	⊙	46.84	$(3/2^-)$	33s(β^-)
v	23	46		2/2	5/7	12/12	4/2			23/23	○	-37.071	0^+	0.42(ε)

		47	/1	2/2	5/7	12/12	4/2	23/24	⊙	-42.001	$3/2^-$	32.6min(ε)
		48		2/2	6/6	10/14	5/3	23/25	○	-44.473	4^+	16.0d(ε)
		49	/1	2/2	6/6	10/14	5/3	23/26	⊙	-47.957	$7/2^-$	330d(ε)
		50		2/2	6/6	10/14	5/5	23/27	○	-49.219	6^+	0.250%
		51	/1	2/2	6/6	10/14	5/5	23/28	⊙	-5.199	$7/2^-$	99.750%
		52		2/2	6/6	10/14	5/7	23/29	○	-51.439	3^+	3.76min(β^-)
		53	/1	2/2	6/6	10/14	5/7	23/30	⊙	-51.863	$7/2^-$	1.6min(β^-)
		54		2/2	5/7	10/14	6/8	23/31	○	-49.93	$(3,4,5)^+$	50s(β^-)
Cr	24	46		2/2	6/6	12/12	4/2	24/22	○	-29.461	0^+	0.26s(ε)
		47	/1	2/2	6/6	12/12	4/2	24/23	⊙	-34.618	$3/2^-$	0.51s(ε)
		48		2/2	5/7	12/12	5/3	24/24	○	-42.818	0^+	21.6h(ε)
		49	/1	2/2	5/7	12/12	5/3	24/25	⊙	-45.329	$5/2^+$	41.9min(ε)
		50		2/2	5/7	12/12	5/5	24/26	○	-50.258	0^+	4.35%
		51	/1	2/2	6/6	10/14	6/4	24/27	⊙	-51.448	$7/2^-$	27.7d(ε)
		52		2/2	6/6	10/14	6/6	24/28	○	-55.415	0^+	83.79%
		53	/1	2/2	6/6	10/14	6/6	24/29	⊙	-55.284	$3/2^-$	9.5%
		54		2/2	5/7	10/14	7/7	24/30	○	-56.931	0^+	2.36%
		55	/1	2/2	6/6	10/14	6/8	24/31	⊙	-55.106	$3/2^-$	3.5min(β^-)
		56		2/2	5/7	10/14	7/9	24/32	○	-55.265		5.9min(β^-)
Mn	25	50		2/2	5/7	12/12	6/4	25/25	○	-42.626	0^+	0.28s(ε)

Shell Structure of Nuclides

Nuclide	**Z**	**A**	**Shell Structure of Nucleon(*p/n*)**							**ΣP / n**	**King of Structure**	**Binding Energy Δ (MeV)**	1^π	**$T_{1/2}$**
			1	**2**	**3**	**4**	**5**	**6**	**7**					
		51	/1	2/2	5/7	12/12	6/4			25/26	⊙	-48.240	$5/2^-$	46.2min(ε)
		52		2/2	6/6	10/14	7/5			25/27	○	-50.704	6^+	5.59d(ε)
		53	/1	2/2	6/6	10/14	7/5			25/28	⊙	-54.687	$7/2^-$	3.7×10^6y(ε)
		54		2/2	5/7	10/14	8/6			25/29	○	-55.554	3^+	312d(ε)
		55	/1	2/2	6/6	10/14	7/7			25/30	⊙	-57.710	$5/2^-$	100%
		56		2/2	6/6	10/14	7/9			25/31	○	-56.909	3^+	2.58h(β^-)
		57	/1	2/2	6/6	10/14	7/9			25/32	⊙	-57.487	$5/2^-$	1.6min(β^-)
		58		2/2	5/7	10/14	8/10			25/33	○	-55.802	3^+	65s(β^-)
Fe	26	51	/1	2/2	6/6	12/12	6/4			26/25	⊙	-40.228	$(5/2)^-$	0.25s(ε)

*It is an obvious that $^{55}_{24}Cr_{31}$ is listed as (ε) decay in the original table. This nuclide should be in the (β^-) decay. The unstable isotopes after nuclides with high filling levels all belong to (β^-) decay.

*The 3rd and 4th shells of $^{55}_{28}Ni_{27}$ are all of *p/n* structure of full protons. After 3 consecutive (ε) decays, it becomes stable. Its decay procedure is $^{55}_{28}Ni_{27}+e\rightarrow{}^{55}_{27}Co_{28}+e\rightarrow{}^{55}_{25}Mn_{30}$

		52		2/2	5/7	12/12	7/5	26/26	○	-48.332	0^+	8.27h(ε)
		53	/1	2/2	5/7	12/12	7/5	26/27	⊙	-50.994	$7/2^-$	8.51min(ε)
		54		2/2	5/7	12/12	7/7	26/28	○	-56.251	0^+	5.8%
		55	/1	2/2	6/6	10/14	8/6	26/29	⊙	-57.479	$3/2^-$	2.7y(ε)
		56		2/2	6/6	10/14	8/8	26/30	○	60.604	0^+	91.8%
		57	/1	2/2	6/6	10/14	8/8	26/31	⊙	-60.179	$1/2^-$	2.15%
		58		2/2	5/7	10/14	9/9	26/32	○	-62.152	0^+	0.29%
		59	/1	2/2	5/7	10/14	8/10	26/33	⊙	-60.661	$3/2^-$	44.6d(β^-)
		60		2/2	5/7	10/14	9/11	26/34	○	-61.437	0^+	1.5×10^6y(β^-)
		61	/1	2/2	5/7	10/14	9/11	26/35	⊙	-59.01	$(3/2,5/2)^-$	6.0min(β^-)
		62		2/2	5/7	10/14	9/13	26/36	○	-58.86	0^+	68s(β^-)
Co	27	54		2/2	5/7	12/12	8/6	27/27	○	-48.010	0^+	0.19s(ε)
		55	/1	2/2	5/7	12/12	8/6	27/28	⊙	-54.024	$7/2^-$	17.5h(ε)
		56		2/2	6/6	10/14	9/7	27/29	○	-56.037	4^+	78.8d(ε)
		57	/1	2/2	6/6	10/14	9/7	27/30	⊙	-59.342	$7/2^-$	271d(ε)
		58		2/2	5/7	10/14	10/8	27/31	○	-59.844	2^+	70.8d(ε)
		59	/1	2/2	6/6	10/14	9/9	27/32	⊙	-62.226	$7/2^-$	100%
		60		2/2	6/6	10/14	9/11	27/33	○	-61.647	5^+	5.27y(β^-)
		61	/1	2/2	6/6	10/14	9/11	27/34	⊙	-62.897	$7/2^-$	1.65h(β^-)
		62		2/2	5/7	10/14	10/12	27/35	○	-61.630	2^+	1.5min(β^-)
		63	/1	2/2	5/7	10/14	10/12	27/36	⊙	-61.850	$(7/2)^-$	27.5s(β^-)
Ni	28	55	/1	2/2	6/6	12/12	8/6	28/27	○	-45.334	0^+	6.10d(ε)*
		56		2/2	5/7	12/12	9/7	28/28	○	-53.902	0^+	6.10d(ε)
		57	/1	2/2	5/7	12/12	9/7	28/29	⊙	-56.077	$3/2^-$	36.0h(ε)
		58		2/2	5/7	12/12	9/9	28/30	○	-60.224	0^+	68.3%
		59	/1	2/2	6/6	10/14	10/8	28/31	⊙	-61.153	$3/2^-$	$7..5\times10^4$y(ε)

Shell Structure of Nuclides

*The (β) decay feature of $^{67}_{28}Ni_{39}$ is not confirmed in the original table. From its shell structure, we know it should decay in the (β^-) way.

**Cu_{35} decays in twos. In (ε) decay it absorbs an electron and into $^{64}_{28}Ni_{36}$. In (β^-) decay it release an electron and decays into $^{64}_{30}Zn_{34}$.

***The nuclides with *p/n* on outside shells not being equal tone and the protons and shells bring in even number tend to be stable .Similar nuclides include $^{70}_{30}Zn_{40}$, $^{72}_{32}Ge_{40}$, $^{74}_{32}Ge_{42}$, $^{80}_{34}Se_{46}$ etc

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	$T_{1/2}$
		60		2/2	6/6	10/14	10/10			28/32	○	-64.470	0^+	26.1%
		61	/1	2/2	6/6	10/14	10/10			28/33	⊙	-64.219	$3/2^+$	1.13%
		62		2/2	5/7	10/14	11/11			28/34	○	-66.745	0^+	3.59%
		63	/1	2/2	6/6	10/14	10/12			28/35	⊙	-65.513	$1/2^-$	100y(β^-)
		64		2/2	6/6	10/14	10/14			28/36	○	-67.098	0^+	0.91%
		65	/1	2/2	5/7	10/14	11/13			28/37	⊙	-65.124	$5/2^-$	2.52h(β)
		66		2/2	5/7	10/14	11/15			28/35	○	-66.021	0^+	54.8h(β^-)
		67	/1	2/2	5/7	10/14	11/15			29/39	⊙	-63.47		21s (β^-)
Cu	29	59	/1	2/2	5/7	12/12	10/8			29/30	⊙	-56.352	$3/2^-$	82s(ε)
		60		2/2	6/6	10/14	11/9			29/31	○	-58.343	2^+	23.4min(ε)
		61	/1	2/2	6/6	10/14	11/9			29/32	⊙	-61.981	$3/2^-$	82s(ε)
		62		2/2	5/7	10/14	12/10			29/33	○	-62.796	1^+	9.73min(ε)
		63	/1	2/2	6/6	10/14	11/11			29/34	⊙	-65.578	$3/2^-$	69.2%
		64		2/2	6/6	10/14	11/13			29/35	○	-65.423	1^+	12.7h(ε)**
		65	/1	2/2	5/7	10/14	12/12			29/36	⊙	-67.262	$3/2^-$	30.8%
		66		2/2	5/7	10/14	12/14			29/37	○	-66.257	1^+	5.10min(β^-)
		67	/1	2/2	5/7	10/14	12/14			29/38	⊙	-67.305	$3/2^-$	61.9h(β^-)
		68		2/2	6/6	10/14	11/17			29/39	○	-65.39	1^+	31s(β^-)
Zn	30	61	/1	2/2	5/7	12/12	11/9			30/31	⊙	-56.58	$3/2^-$	89s(ε)
		62		2/2	6/6	10/14	12/10			30/32	○	-61.169	0^+	9.2h(ε)
		63	/1	2/2	6/6	10/14	12/10			30/33	⊙	-62.211	$3/2^-$	38.1min(ε)
		64		2/2	6/6	10/14	12/12			30/34	○	-66.001	0^+	48.6%
		65	/1	2/2	5/7	10/14	13/11			30/35	⊙	-65.910	$5/2^-$	244d(ε)
		66		2/2	5/7	10/14	13/13			30/36	○	-68.898	0^+	27.9%
		67	/1	2/2	5/7	10/14	13/13			30/37	⊙	-67.880	$5/2^-$	4.10%
		68		2/2	6/6	10/14	12/16			30/38	○	-70.006	0^+	18.8%***
		69	/1	2/2	5/7	10/14	13/15			30/39	⊙	-68.417	$1/2^-$	2.4min(β^-)
		70		2/2	6/6	10/14	12/18			30/40	○	-69.560	0^+	0.62%
		71	/1	2/2	5/7	10/14	13/17			30/41	⊙	-67.324	$1/2^-$	2.4min(β^-)
		72		2/2	5/7	10/14	13/19			30/42	○	-68.134	0^+	46.5h(β^-)
		73	/1	2/2	5/7	10/14	13/19			30/43	⊙	-65.03	$(3/2)^-$	24s(β^-)*
Ga	31	64		2/2	6/6	10/14	13/11			31/33	○	-58.836	0^+	2.6min(ε)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV))	1^{π}	$T_{1/2}$
		65	/1	2/2	6/6	10/14	13/11			31/34	⊙	-62.654	$3/2^-$	15.2min(ε)
		66		2/2	5/7	10/14	14/12			31/35	○	-63.723	0^+	9.4h(ε)
		67	/1	2/2	5/7	10/14	14/12			31/36	⊙	-66.878	$3/2^-$	78.3h(ε)

		68		2/2	6/6	10/14	13/15	31/37	○	-67.085	1^+	68.1min(ε)
		69	/1	2/2	5/7	10/14	14/14	31/38	⊙	-69.322	$3/2^-$	60.1%
		70		2/2	5/7	10/14	14/16	31/39	○	-68.905	1^+	21.1min(β^-)
		71	/1	2/2	5/7	10/14	14/16	31/40	⊙	-70.142	$3/2^-$	39.9%
		72		2/2	6/6	10/14	13/19	31/41	○	-68.591	3^-	141h(β^-)
		73	/1	2/2	6/6	10/14	13/19	31/42	⊙	-69.73	$3/2^-$	4.87h(β^-)
		74		2/2	6/6	10/14	13/21	31/43	○	-68.02	$(4)^-$	8.1min(β^-)
		75	/1	2/2	6/6	10/14	13/21	31/44	⊙	-68.56	$3/2^-$	2.1min(β^-)
Ge	32	66		2/2	6/6	10/14	14/12	32/34	○	-61.621	0^+	2.3h(ε)
		67	/1	2/2	6/6	10/14	14/12	32/35	⊙	-62.45	$(1/2)^-$	19.0min(ε)
		68		2/2	5/7	12/12	13/15	32/36	○	-66.972	0^+	271d(ε)
		69	/1	2/2	5/7	10/14	15/13	32/37	⊙	-67.096	$5/2^-$	39.0h(ε)
As	33	70		2/2	5/7	10/14	15/15	32/38	○	-70.561	0^+	20.5%
		71	/1	2/2	6/6	10/14	14/16	32/39	⊙	-69.906	$1/2^-$	11.2d(ε)
		72		2/2	6/6	10/14	14/18	32/40	○	-72.583	0^+	27.4%
		73	/1	2/2	6/6	10/14	14/18	32/41	⊙	-71.294	$9/2^+$	7.8%
		74		2/2	6/6	10/14	14/20	32/42	○	-73.422	0^+	36.5%
		75	/1	2/2	5/7	12/12	13/21	32/43	⊙	-71.856	$1/2^-$	82.8min(β^-)
		76		2/2	6/6	10/14	14/22	32/44	○	-73.214	0^+	7.8%
		77	/1	2/2	5/7	10/14	15/21	32/45	⊙	-71.214	$7/2^+$	11.3h(β^-)
		78		2/2	5/7	10/14	15/23	32/46	○	-71.76	0^+	1.45h(β^-)
		79	/1	2/2	5/7	10/14	15/23	32/47	⊙	-69.56	$(1/2)^-$	19s(β^-)
		70		2/2	5/7	10/14	16/14	33/37	○	-64.339	4^+	53min(ε)
		71	/1	2/2	5/7	12/12	14/16	33/38	⊙	-67.893	$5/2^-$	61h(ε)
		72		2/2	6/6	10/14	15/17	33/39	○	-68.232	2^-	26.0h(ε)
		73	/1	2/2	6/6	10/14	15/17	33/40	⊙	-70.949	$3/2^-$	80.3d(ε)
		74		2/2	6/6	10/14	15/19	33/41	○	-70.860	2^-	17.8d(ε)
		75	/1	2/2	5/7	12/12	14/20	33/42	⊙	-73.034	$3/2^-$	100%
		76		2/2	6/6	10/14	15/21	33/43	○	-72.291	2^-	26.3h(β^-)
		77	/1	2/2	6/6	10/14	15/21	33/44	⊙	-73.916	$3/2^-$	38.8h(β^-)
		78		2/2	6/6	10/14	15/23	33/45	○	-72.74	$(2)^-$	91min(β^-)
		79	/1	2/2	6/6	10/14	15/23	33/46	⊙	-73.71	$3/2^-$	9.0min(β^-)

Shell Structure of Nuclides

*The *p/n* s on all shells except the first shell of $^{70}_{31}Ca_{39}$ and $^{71}_{31}Ca_{40}$ are the same, but differ in stability. This shows different characteristics of "○"nuclides and "⊙"ones. Nuclear Physics, *P*390 ~ *P*405 , Xu Side, published by Qinghua university Press,1992 [9].

Nuclide	Z	A	Shell Structure of Nucleon(*p*/*n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	$T_{1/2}$
Se	34	71 /1	2/2	6/6	10/14	16/14				34/37	⊙	-63.46	$5/2^-$	4.7min(ε)
		72	2/2	5/7	12/12	15/17				34/38	○	-67.894	0^+	8.4d(ε)
		73 /1	2/2	5/7	12/12	15/17				34/39	⊙	-68.209	$9/2^+$	7.1h(ε)
		74	2/2	5/7	10/14	17/17				34/40	○	-72.213	0^+	0.87%
		75 /1	2/2	5/7	12/12	15/19				34/41	⊙	-72.213	$5/2^+$	119.8d(ε)
		76	2/2	6/6	10/14	16/20				34/42	○	-75.259	0^{+-}	9.0%
		77 /1	2/2	6/6	10/14	16/20				34/43	⊙	-74.606	$1/2^-$	7.6%
		78	2/2	6/6	10/14	16/22				34/44	○	-77.032	0^+	23.5%
		79 /1	2/2	5/7	12/12	15/23				34/45	⊙	-75.911	$7/2^+$	$<6.5\times10^4$y (β^-)
		80	2/2	6/6	10/14	16/24				34/46	○	-77.761	0^+	49.8%
		81 /1	2/2	5/7	12/12	15/25				34/47	⊙	-76.391	(1/2)	18.5min(β^-)
		82	2/2	6/6	10/14	16/26				34/48	○	-77.586	0^+	9.2%
		83 /1	2/2	5/7	10/14	17/25				34/49	⊙	-75.333	$9/2^+$	22.5min(β^-)
		84	2/2	5/7	10/14	17/27				34/50	○	-75.942	0^+	3.3 min(β^-)
Br	35	76	2/2	6/6	10/14	17/19				35/41	○	-70.303	1^-	16.1h(ε)
		77 /1	2/2	6/6	10/14	17/19				35/42	⊙	-73.242	$3/2^-$	57.0h(ε)
		78	2/2	6/6	10/14	17/21				35/43	○	-73.458	1^+	6.46min(ε)
		79 /1	2/2	5/7	12/12	16/22				35/44	⊙	-76.070	$3/2^-$	50.69%
		80	2/2	6/6	10/14	17/23				35/45	○	-75.891	1^+	17.6 min(ε)
		81 /1	2/2	5/7	12/12	16/24				35/46	⊙	-77.976	$3/2^-$	49.31%
		82	2/2	6/6	10/14	17/25				35/47	○	-77.498	5^-	35.3h(β^-)
		83 /1	2/2	6/6	10/14	17/25				35/48	⊙	-79.025	$(3/2)^-$	2.39h(β^-)
		84	2/2	6/6	10/14	17/27				35/49	○	-77.759	2^-	31.8min(β^-)
		85 /1	2/2	6/6	10/14	17/27				35/50	⊙	-78.67	$(3/2)^-$	2.9min(β^-)
Kr	36	75 /1	2/2	6/6	12/12	16/18				36/39	⊙	-64.16s		4.3min(ε)
		76	2/2	5/7	12/12	17/19				36/40	○	-69.10	0^+	14.8h(ε)
		77 /1	2/2	5/7	12/12	17/19				36/41	⊙	-70.236	$5/2^+$	75min(ε)
		78	2/2	5/7	10/14	19/19				36/42	○	-74.150	0^{+-}	0.356%
		79 /1	2/2	5/7	12/12	17/21				36/43	⊙	-74.439	$1/2^-$	35.0h(ε)
		80	2/2	6/6	10/14	18/22				36/44	○	-77.897	0^+	2.27%
		81 /1	2/2	5/7	12/12	17/23				36/45	⊙	--77.654	$7/2^+$	2.1×10^5y(ε)
		82	2/2	6/6	10/14	18/24				36/46	○	-80.591	0^+	11.6%
		83 /1	2/2	6/6	10/14	18/24				36/47	⊙	-79.985	$9/2^+$	11.5%
		84	2/2	6/6	10/14	18/26				36/48	○	-82.432	0^+	57.0%
		85 /1	2/2	5/7	12/12	17/27				36/49	⊙	-81.472	$9/2^+$	10.7y(β^-)
		86	2/2	6/6	10/14	18/28				36/50	○	-83.263	0^+	17.3%
		87 /1	2/2	5/7	12/12	17/29				36/51	⊙	-80.707	$5/2^+$	76 min(β^-)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	$T_{1/2}$
		88		2/2	5/7	10/14	19/29			36/52	○	-79.689	0^+	2.84(β^-)
		89	/1	2/2	5/7	10/14	19/29			36/53	⊙	-76.79	$(5/2)^+$	3.18min(β^-)
Rb	37	82		2/2	6/6	10/14	19/23			37/45	○	-76.213	1^+	1.25min(ε)
		83	/1	2/2	6/6	10/14	19/23			37/46	⊙	-78.914	$5/2^-$	86.2d(ε)
		84		2/2	6/6	10/14	19/25			37/47	○	-79.752	2^-	32.9d(ε)
		85	/1	2/2	5/7	12/12	18/26			37/48	⊙	-82.159	$5/2^-$	72.17%
		86		2/2	6/6	10/14	19/27			37/49	○	-82.739	2^-	18.8d(β^-)
		87	/1	2/2	5/7	12/12	18/28			37/50	⊙	-84.596	$3/2^-$	27.83%
		88		2/2	6/6	10/14	19/29			37/51	○	-82.602	2^-	17.8(β^-)
		89	/1	2/2	6/6	10/14	19/29			37/52	⊙	-81.717	$(3/2)^-$	15.2min(β^-)
		90		2/2	5/7	10/14	20/28	/2		37/53	⊙	-79.57	(1^-)	153s(β^-)*
Sr	38	81	/1	2/2	5/7	12/12	19/21			38/43	⊙	-71.40	$(1/2^-)$	22min(ε)
		82		2/2	5/7	12/12	19/23			38/44	○	-75.999	0^+	25.0d(ε)
		83	/1	2/2	5/7	12/12	19/23			38/45	⊙	-76.664	$7/2^+$	32.4d(ε)
		84		2/2	6/6	10/14	20/24			38/46	○	-81.641	0^+	0.56%
		85	/1	2/2	5/7	12/12	19/25			38/47	⊙	-81.095	$9/2^+$	64.8d(ε)
		86		2/2	6/6	10/14	20/26			38/48	○	-84.512	0^+	9.8%
		87	/1	2/2	6/6	10/14	20/26			38/49	⊙	-84.869	$9/2^+$	7.0%
		88		2/2	6/6	10/14	20/28			38/50	○	-87.911	0^+	82.6%**
		89	/1	2/2	5/7	12/12	19/29			38/51	⊙	-86.203	$5/2^+$	50.5d(β^-)
		90		2/2	6/6	10/14	20/28	/2		38/52	○	-85.935	0^+	28.8y(β^-)
		91	/1	2/2	6/6	10/14	20/28	/2		38/53	⊙	-83.666	$(5/2)^+$	9.5h(β^-)
		92		2/2	5/7	10/14	20/28	1/3		38/54	○	-82.892	0^+	2.7h(β^-)
		93	/1	2/2	5/7	10/14	20/28	1/3		38/55	⊙	-80.28	$(7/2)^+$	7.4min(β^-)
Y	39	84		2/2	6/6	10/14	21/23			39/45	○	-73.692	(5^-)	39min(ε)***
		85	/1	2/2	6/6	10/14	21/23			39/46	⊙	-77.855	$(1/2)^-$	2.7h(ε)
		86		2/2	6/6	10/14	21/25			39/47	○	-79.239	4^-	14.7h(ε)
		87	/1	2/2	6/6	10/14	21/25			39/48	⊙	-83.007	$1/2^-$	80.3h(ε)

* $^{90}_{37}Rb_{53}$, $^{90}_{38}Sr_{53}$ show the characteristics of 6-shelled structures.

** $^{88}_{38}Sr_{50}$ is a 5-shelled nuclide, showing that *p/n*=20/28 is a stable combination of 5th full-filled shell.

***The number of protons of a stable nuclide is smaller than or equal to 20($p \le 20$).When the 5th shell is most outside, the proton number may be bigger than 20.But they are all non-stable nuclides

**** $^{89}_{39}Y_{50}$ is a 5-shelled of "⊙" category. It shows that *p/n*=20/28 is a stable combination of the *p/n* on the 5th shell. $^{89}_{38}Sr_{50}$ releases an electron. $^{89}_{40}Zr_{49}$ attracts an electron and decays into $^{89}_{39}Y_{50}$. It shows that *p/n*=20/28 is a stable combination of *p/n* on the 5th shell .At the same time it shows that such quasi-full structures as *p/n*=19/29 and *p/n* =21/27 cannot form stable nuclides

		88		2/2	6/6	10/14	21/27			39/49	○	-84.298	4^-	106.6d(ε)***
		89	/1	2/2	5/7	12/12	20/28			39/50	⊙	-87.695	$1/2^-$	100%****

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	$T_{1/2}$
			1	2	3	4	5	6	7					
		90		2/2	5/7	12/12	20/28	/2		39/51	○	-86.481	2^-	64.1h(β^-)
		91	/1	2/2	5/7	12/12	20/28	/2		39/52	⊙	-86.350	$1/2^-$	58.5d(β^-)
		92		2/2	6/6	10/14	20/28	1/3		39/53	○	-84.822	2^-	3.54h(β^-)
		93	/1	2/2	6/6	10/14	20/28	1/3		39/54	⊙	-84.277	$1/2^-$	10.2h(β^-)
		94		2/2	5/7	12/12	18/30	2/4		39/55	○	-82.382	2^-	18.7min(β^-)
Zr	40	87	/1	2/2	5/7	12/12	21/25			40/47	⊙	-79.43	$(9/2^+)$	1.6h(ε)*
		88		2/2	5/7	12/12	21/27			40/48	○	-83.621	0^+	83.4d(ε)*
		89	/1	2/2	5/7	12/12	21/27			40/49	⊙	-84.860	$9/2^+$	78.4h(ε)
		90		2/2	5/7	12/12	20/28	1/1		40/50	○	-88.765	0^+	51.5%
		91	/1	2/2	5/7	12/12	20/28	1/1		40/51	⊙	-87.892	$5/2^+$	11.2%
		92		2/2	6/6	10/14	20/28	2/2		40/52	○	-88.456	0^+	17.1%
		93	/1	2/2	5/7	12/12	20/28	1/3		40/53	⊙	-87.117	$5/2^+$	1.5×10^6y(β^-)
		94		2/2	5/7	12/12	18/30	3/3		40/54	○	-87.264	0^+	17.4%**
		95	/1	2/2	6/6	12/12	18/30	2/4		40/55	⊙	-85.663	$5/2^+$	64.0d(β^-)
		96		2/2	6/6	10/14	18/30	4/4		40/56	○	-85.445	0^+	2.80%**
		97	/1	2/2	5/7	12/12	18/30	3/5		40/57	⊙	-82.954	$1/2^+$	16.9h(β^-)
		98		2/2	6/6	10/14	18/30	4/6		40/58	○	-81.292	0^+	31s(β^-)
Nb	41	89	/1	2/2	5/7	12/12	20/26	2/		41/48	⊙	-80.621	$(1/2)^-$	2.0h(ε)***
		90		2/2	5/7	12/12	20/28	2/		41/49	○	-82.654	8^+	14.6h(ε)
		91	/1	2/2	5/7	12/12	20/28	2/		41/50	⊙	-86.637	$(9/2)^+$	700y(ε)
		92		2/2	6/6	10/14	20/28	3/1		41/51	○	-86.448	$(7)^+$	3.5×10^7y(ε)
		93	/1	2/2	5/7	12/12	20/28	2/2		41/52	⊙	-87.209	$9/2^+$	100%
		94		2/2	5/7	12/12	20/28	2/4		41/53	○	-86.367	6^+	2.0×10^4y(β^-)
		95	/1	2/2	5/7	12/12	20/28	2/4		41/54	⊙	-86.786	$9/2^+$	35.0d(β^-)
		96		2/2	6/6	10/14	20/28	3/5		41/55	○	-85.608	6^+	23.4h(β^-)
		97	/1	2/2	6/6	10/14	20/28	3/5		41/56	⊙	-85.612	$9/2^+$	72min(β^-)
Mo	42	90		2/2	6/6	12/12	20/28	2/		42/48	○	-80.167	0^+	5.67h(ε)
		91	/1	2/2	6/6	12/12	20/28	2/		42/49	⊙	-82.199	$9/2^+$	15.5min(ε)
		92		2/2	6/6	12/12	20/28	2/2		42/50	○	-86.807	0^+	14.8%
		93	/1	2/2	5/7	12/12	20/28	3/1		42/51	⊙	-86.803	$5/2^+$	3500y(ε)
		94		2/2	5/7	12/12	20/28	3/3		42/52	○	-88.412	0^+	9.3%
		95	/1	2/2	5/7	12/12	20/28	3/3		42/53	⊙	-87.712	$5/2^+$	15.9%

	96	2/2	6/6	10/14	20/28	4/4	42/54	○	-88.795	0^+	16.7%

* ${}^{87}_{40}Zr_{47}$ and Zr_{48} are the same with Y_{45}. The number of protons on the 5th shell is bigger than20 ($p > 20$).They is all non-stable nuclides.

** ${}^{94}_{40}Zr_{54}$, ${}^{98}_{42}No_{56}$, and Mo_{56} show that *p/n*=18/30 is a stable combination of *p/n* on 5th full-filled shell.

*** ${}^{89}_{41}Nb_{48}$, restricted by the maximal number of protons of all shells, developed into a 6-shelled nuclide, of which $P_2 = 2, P_3 \le 6, \quad P_4 \le 12, \quad P_5 \le 20$.

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	$T_{1/2}$
		97	/1	2/2	6/6	10/14	20/28	4/4		42/55	⊙	-87.544	$5/2^+$	9.6%
		98		2/2	5/7	12/12	18/30	5/5		42/56	○	-88.115	0^+	24.1%
		99	/1	2/2	6/6	10/14	20/28	4/6		42/57	⊙	-85.970	$1/2^+$	66.0h(β^-)
		100		2/2	6/6	10/14	18/30	6/6		42/58	○	-86.198	0^+	9.6%
		101	/1	2/2	5/7	12/12	18/30	5/7		42/59	⊙	-83.516	$1/2^+$	14.6min
Tc	43	94		2/2	5/7	12/12	20/28	4/2		43/51	○	-84.156	7^+	293min(ε)
		95	/1	2/2	5/7	12/12	20/28	4/2		43/52	⊙	-86.013	$9/2^+$	20.0h(ε)
		96		2/2	6/6	10/14	20/28	5/3		43/53	○	-85.821	7^+	4.3d(ε)
		97	/1	2/2	6/6	10/14	20/28	5/3		43/54	⊙	-87.224	$9/2^+$	2.6×10^6y(ε)
		98		2/2	5/7	12/12	20/28	4/6		43/55	○	-86.434	$(6)^+$	4.2×10^6(β^-)
		99	/1	2/2	5/7	12/12	20/28	4/6		43/56	⊙	-87.326	$9/2^+$	2.14×10^6(β^-)
		100		2/2	6/6	10/14	20/28	5/7		43/57	○	-86.019	1^+	15.8s(β^-)
Ru	44	94		2/2	6/6	12/12	20/28	4/2		44/50	○	-82.571	0^+	52min(ε)*
		95	/1	2/2	6/6	12/12	20/28	4/2		44/51	⊙	-83.452	$5/2^+$	1.65h(ε)
		96		2/2	6/6	12/12	20/28	4/4		44/52	○	-86.075	0^+	5.5%
		97	/1	2/2	5/7	12/12	20/28	5/3		44/53	⊙	-86.07	$5/2^+$	2.88d(ε)
		98		2/2	5/7	12/12	20/28	5/5		44/54	○	-88.226	0^+	1.86%
		99	/1	2/2	5/7	12/12	20/28	5/5		44/55	⊙	-87.620	$5/2^+$	12.7%
		100		2/2	6/6	10/14	20/28	6/6		44/56	○	-89.222	0^+	12.6%
		102		2/2	5/7	12/12	18/30	7/7		44/58	○	-89.100	0^+	31.6%
		103	/1	2/2	6/6	10/14	20/28	6/8		44/59	⊙	-87.261	$3/2^+$	39.4d(β^-)
		104		2/2	6/6	10/14	18/30	8/8		44/60	○	-88.099	0^+	18.7%
		105	/1	2/2	5/7	12/12	18/30	7/9		44/61	⊙	-85.938	$3/2^+$	4.44h(β^-)
		106		2/2	6/6	10/14	18/30	8/10		44/62	○	-86.333	0^+	372d(β^-)
		107	/1	2/2	6/6	10/14	18/30	8/10		44/63	⊙	-83.71	$(5/2^+)$	3.8min(β^-)
Rh	45	98		2/2	5/7	12/12	20/28	6/4		45/53	○	-83.168	$(2)^+$	8.7min(ε)
		99	/1	2/2	5/7	12/12	20/28	6/4		45/54	⊙	-85.517	$(1/2^-)$	16.1d(ε)
		100		2/2	6/6	10/14	20/28	7/5		45/55	○	-85.592	1^-	20.8h(ε)
		101	/1	2/2	6/6	10/14	20/28	7/5		45/56	⊙	-87.410	$1/2^-$	3.3y(ε)
		102		2/2	5/7	12/12	18/30	8/6		45/57	○	-86.807	6^+	2.9h(ε)
		103	/1	2/2	6/6	10/14	20/28	7/7		45/58	⊙	-88.024	$1/2^-$	100%
		104		2/2	6/6	10/14	20/28	7/9		45/59	○	-86.952	1^+	42.3s(β^-)
		105	/1	2/2	6/6	10/14	20/28	7/9		45/60	⊙	-87.855	$7/2^+$	35.4h(β^-)

*The *p/n*'s on the 3rd, 4th, and 5th shells of $^{94}_{44}Ru_{50}$ all belong to "I" category, i, e, the *p/n* stickier of full protons through absorption of two electrons, it decays into $^{94}_{42}Mo_{52}$ and tend to be stable. It shows that nuclides whose *p/n*'s of all shells alternate between full and mon-full are more likely to be stable. Most of the stable nuclides bear this characteristic.

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	$T_{1/2}$
		106		2/2	5/7	12/12	18/30	8/10		45/61	○	-86.372	1^+	29.8s(β^-)
Pd	46	99	/1	2/2	6/6	12/12	20/28	6/4		46/53	⊙	-86.112	$(5/2^+)$	21.4min(ε)
		100		2/2	5/7	12/12	20/28	7/5		46/54	○	-85.230	0^+	3.6d(ε)
		101	/1	2/2	5/7	12/12	20/28	7/5		46/55	⊙	-85.428	$5/2^+$	8.5h(ε)
		102		2/2	5/7	12/12	20/28	7/7		46/56	○	-87.925	0^+	1.0%
		103	/1	2/2	6/6	10/14	20/28	8/6		46/57	⊙	-87.478	$5/2^+$	17.0d(ε)
		104		2/2	6/6	10/14	20/28	8/8		46/58	○	-89.400	0^+	11.0%
		105	/1	2/2	6/6	10/14	20/28	8/8		46/59	⊙	-88.422	$5/2^+$	22.2%
		106		2/2	5/7	12/12	18/30	9/9		46/60	○	-89.913	0^+	27.3%
		107	/1	2/2	6/6	10/14	20/28	8/10		46/61	⊙	-88.371	$5/2^+$	6.5×10^6y(β^-)
		108		2/2	6/6	10/14	18/30	10/10		46/62	○	-89.523	0^+	26.7%
		109	/1	2/2	5/7	12/12	18/30	9/11		46/63	⊙	-87.606	$5/2^+$	13.4h(β^-)
		110		2/2	5/7	10/14	18/30	11/11		46/64	○	-88.335	0^+	11.8%
		111	/1	2/2	6/6	10/14	18/30	10/12		46/65	⊙	-86.03	$5/2^+$	23min(β^-)
		112		2/2	5/7	10/14	18/30	11/13		46/66	○	-88.326	0^+	21.0h(β^-)
Ag	47	103	/1	2/2	5/7	12/12	20/28	8/6		47/56	⊙	-84.80	$7/2^+$	65.7min(ε)
		104		2/2	6/6	10/14	20/28	9/7		47/57	○	-85.150	5^+	69.2min(ε)
		105	/1	2/2	6/6	10/14	20/28	9/7		47/58	⊙	-87.075	$1/2^-$	41.3d(ε)
		106		2/2	5/7	12/12	18/30	10/8		47/59	○	-86.929	1^+	24.0min(ε)
		107	/1	2/2	6/6	10/14	20/28	9/9		47/60	⊙	-88.404	$1/2^-$	51.83%
		108		2/2	6/6	10/14	20/28	9/11		47/61	○	-87.602	1^+	2.4min(β^-)
		109	/1	2/2	5/7	12/12	18/30	10/10		47/62	⊙	-88.722	$1/2^-$	48.17%
		110		2/2	5/7	12/12	18/30	10/12		47/63	○	-87.456	1^+	24.4s (β^-)
		111	/1	2/2	5/7	12/12	18/30	10/12		47/64	⊙	-88.226	$1/2^-$	7.45d(β^-)
		112		2/2	6/6	10/14	18/30	11/13		47/65	○	-86.620	2^-	3.14h(β^-)
Cd	48	104		2/2	5/7	12/12	20/28	9/7		48/56	○	-83.57	0^+	58min(ε)
		105	/1	2/2	5/7	12/12	20/28	9/7		48/57	⊙	-84.336	$5/2^+$	56.0min(ε)
		106		2/2	5/7	12/12	20/28	9/9		48/58	○	-87.131	0^+	1.25%
		107	/1	2/2	6/6	10/14	20/28	10/8		48/59	⊙	-86.987	$5/2^+$	6.50h(ε)
		108		2/2	6/6	10/14	20/28	10/10		48/60	○	-89.251	0^+	0.89%
		109	/1	2/2	5/7	12/12	18/30	11/9		48/61	⊙	-88.540	$5/2^+$	463d(ε)
		110		2/2	5/7	12/12	18/30	11/11		48/62	○	-90.349	0^+	12.5%
		111	/1	2/2	5/7	12/12	18/30	11/11		48/63	⊙	-89.254	$1/2^+$	12.8%
		112			6/6	10/14	18/30	12/12		48/64	○	-90.578	0^+	24.1%
		113	/1		6/6	10/14	18/30	12/12		48/65	⊙	-89.050	$1/2^+$	12.2%
		114			5/7	10/14	18/30	13/13		48/66	○	-90.020	0^+	28.7%
		115	/1		6/6	10/14	18/30	12/14		48/67	⊙	-88.093	$1/2^+$	53.4h(β^-)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	$T_{1/2}$
		116		2/2	6/6	10/14	18/30	12/26		48/68	○	-88.718	0^+	7.5%
		117	/1	2/2	5/7	10/14	18/30	13/15		48/69	⊙	-86.416	$1/2^+$	2.4h(β^-)
		118		2/2	5/7	10/14	18/30	13/17		48/70	○	-86.707	0^+	50.3min(β^-)
In	49	110		2/2	5/7	12/12	18/30	12/10		49/61	○	-86.409	2^+	69.1min(ε)
		111	/1	2/2	5/7	12/12	18/30	12/10		49/62	⊙	-88.405	$9/2^+$	2.83d(ε)
		112		2/2	6/6	10/14	18/30	13/11		49/63	○	-88.000	1^+	14.4min(ε)
		113	/1	2/2	5/7	12/12	18/30	12/12		49/64	⊙	-89.372	$9/2^+$	4.3%
		114		2/2	5/7	12/12	18/30	12/14		49/65	○	-88.576	1^+	71.9s(β^-)
		115	/1	2/2	6/6	10/14	18/30	13/13		49/66	⊙	-89.541	$9/2^+$	95.7%
		116		2/2	6/6	10/14	18/30	13/15		49/67	○	-88.253	1^+	14.1s(β^-)
		117	/1	2/2	6/6	10/14	18/30	13/15		49/68	⊙	-88.944	$9/2^+$	43.8min(β^-)
Sn	50	109	/1	2/2	5/7	12/12	20/28	11/9		50/59	⊙	-82.630	$7/2^+$	18.0min(ε)
		110		2/2	6/6	10/14	20/28	12/10		50/60	○	-85.834	0^+	4.1h(ε)
		111	/1	2/2	6/6	10/14	20/28	12/10		50/61	⊙	-85.941	$1/2^+$	35min(ε)
		112		2/2	6/6	10/14	20/28	12/12		50/62	○	-88.658	0^+	1.01%
		113	/1	2/2	5/7	12/12	18/30	13/11		50/63	⊙	-88.332	$1/2^+$	115.1d(ε)
		114		2/2	5/7	12/12	18/30	13/13		50/64	○	-90.560	0^+	0.67%
		115	/1	2/2	5/7	12/12	18/30	13/13		50/65	⊙	-90.035	$1/2^+$	0.38%
		116		2/2	6/6	10/14	18/30	14/14		50/66	○	-91.526	0^+	14.6%
		117	/1	2/2	6/6	10/14	18/30	14/14		50/67	⊙	-90.399	$1/2^+$	7.75%
		118		2/2	5/7	10/14	18/30	15/15		50/68	○	-91.654	0^+	24.3%
		119	/1	2/2	5/7	10/14	18/30	15/15		50/69	⊙	-90.067	$1/2^+$	8.6%
		120		2/2	6/6	10/14	18/30	14/18		50/70	○	-91.102	0^+	32.4%
		121	/1	2/2	5/7	10/14	18/30	15/17		50/71	⊙	-89.202	$3/2^+$	27.1h(β^-)
		122		2/2	6/6	10/14	18/30	14/20		50/72	○	-89.946	0^+	4.56%
		123	/1	2/2	5/7	10/14	18/30	15/19		50/73	⊙	-87.821	$11/2^-$	129d(β^-)
		124		2/2	6/6	10/14	18/30	14/22		50/74	○	-88.240	0^+	5.46%
		125	/1	2/2	5/7	10/14	18/30	15/21		50/75	⊙	-85.903	$11/2^-$	9.26d(β^-)
		126		2/2	5/7	10/14	18/30	15/23		50/76	○	-86.024	0^+	10^5y(β^-)
		127	/1	2/2	5/7	10/14	18/30	15/23		50/77	⊙	-83.79	$(11/2^-)$	2.1h(β^-)
Sb	51	118		2/2	5/7	10/14	18/30	16/14		51/67	○	-87.976	1^+	3.6min(ε)
		119	/1	2/2	5/7	10/14	18/30	16/14		51/68	⊙	-89.483	$5/2^+$	38.0h(ε)
		120		2/2	6/6	10/14	18/30	15/17		51/69	○	-88.421	1^+	15.8min(ε)
		121	/1	2/2	5/7	10/14	18/30	15/17		51/70	⊙	-89.588	$5/2^+$	57.3%
		122		2/2	5/7	10/14	18/30	16/18		51/71	○	-8.323	2^-	2.70d(β^-)
		123	/1	2/2	5/7	12/12	18/30	14/20		51/72	⊙	-89.218	$7/2^+$	42.7%

		124		2/2	6/6	10/14	18/30	15/21		51/73	○	-87.613	3^-	60.2d(β^-)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	$T_{1/2}$
			1	2	3	4	5	6	7					
		125	/1	2/2	6/6	10/14	18/30	15/21		51/74	⊙	-88.252	$7/2^+$	2.7y(β^-)
		126		2/2	6/6	10/14	18/30	15/23		51/75	○	-86.402	8^-	12.4d(β^-)
		127	/1	2/2	6/6	10/14	18/30	15/23		51/76	⊙	-86.704	$7/2^+$	3.85d(β^-)
Te	52	117	/1	2/2	5/7	12/12	18/30	15/13		52/65	⊙	-85.164	$1/2^+$	62min(ε)
		118		2/2	6/6	10/14	18/30	16/14		52/66	○	-87.671	0^+	6.00d(ε)
		119	/1	2/2	6/6	10/14	18/30	16/14		52/67	⊙	-87.189	$1/2^+$	16.0h(ε)
		120		2/2	6/6	10/14	18/30	16/16		52/68	○	-89.404	0^+	0.091%
		121	/1	2/2	5/7	10/14	18/30	17/15		52/69	⊙	-88.486	$1/2^+$	16.8d(ε)
		122		2/2	5/7	10/14	18/30	17/17		52/70	○	-90.304	0^+	2.5%
		123	/1	2/2	5/7	10/14	18/30	17/17		52/71	⊙	-89.166	$1/2^+$	0.89%
		124		2/2	10/14	10/14	18/30	16/20		52/72	○	-90.518	0^+	4.6%
		125	/1	2/2	10/14	10/14	18/30	16/20		52/73	⊙	-89.019	$1/2^+$	7.0%
		126		2/2	10/14	10/14	18/30	16/22		52/74	○	-90.066	0^+	18.7%
		127	/1	2/2	5/7	12/12	18/30	15/23		52/75	⊙	-88.285	$3/2^+$	9.4h(β^-)
		128		2/2	10/14	12/12	18/30	16/24		52/76	○	-88.992	0^+	31.7%
		129	/1	2/2	10/14	12/12	18/30	17/23		52/77	⊙	-87.007	$3/2^+$	69min(β^-)
		130		2/2	10/14	12/12	18/30	16/26		52/78	○	-87.348	0^+	34.5%
		131	/1	2/2	10/14	12/12	18/30	17/25		52/79	⊙	-85.201	$3/2^+$	25.0min(β^-)
		132		2/2	10/14	10/14	18/30	17/27		52/80	○	-85.213	0^+	78.2h(β^-)
		133	/1	2/2	10/14	12/12	18/30	17/27		52/81	⊙	-82.93	$(3/2)^+$	12.5min(β^-)
I	53	123	/1	2/2	10/14	10/14	18/30	18/16		53/70	⊙	-87.97	$5/2^+$	13.2h(ε)
		124		2/2	10/14	10/14	18/30	17/19		53/71	○	-87.361	2^-	4.18d(ε)
		125	/1	2/2	10/14	12/12	18/30	17/19		53/72	⊙	-88.841	$5/2^+$	60.2d(ε)
		126		2/2	10/14	10/14	18/30	17/21		53/73	○	-87.911	2^-	13.0d(ε)
		127	/1	2/2	12/12	10/14	18/30	16/22		53/74	⊙	-88.980	$5/2^+$	100%
		128		2/2	10/14	12/12	18/30	17/23		53/75	○	-87.734	1^+	25.0min(β^-)
		129	/1	2/2	10/14	12/12	18/30	17/23		53/76	⊙	-88.505	$7/2^+$	1.6×10^7y(β^-)
		130		2/2	10/14	10/14	18/30	17/25		53/77	○	-86.897	5^+	12.4h(β^-)
		131	/1	2/2	10/14	10/14	18/30	17/25		53/78	⊙	-87.451	$7/2^+$	8.04d(β^-)
		132		2/2	10/14	10/14	18/30	17/27		53/79	○	-85.706	4^+	2.30h(β^-)
Xe	54	121	/1	2/2	5/7	12/12	18/30	17/15		54/67	⊙	-82.33	$(5/2^+)$	40.1min(ε)
		122		2/2	6/6	10/14	18/30	18/16		54/68	○	-85.16s	0^+	20.1h(ε)
		123	/1	2/2	6/6	10/14	18/30	18/16		54/69	⊙	-85.29	$(1/2^+)$	2.08h(ε)
		124		2/2	6/6	10/14	18/30	18/18		54/70	○	-87.45	0^+	0.096%
		125	/1	2/2	5/7	12/12	18/30	17/19		54/71	⊙	-87.11	$(1/2^+)$	17h(ε)

	126	2/2	5/7	10/14	18/30	19/19		54/72	○	-89.162	0^+	0.090%
	127 /1	2/2	5/7	12/12	18/30	17/21		54/73	⊙	-88.316	$(1/2^+)$	36.4d(ε)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p*/*n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	$T_{1/2}$
		128		2/2	6/6	10/14	18/30	18/22		54/74	○	-89.861	0^+	1.92%
		129 /1		2/2	6/6	10/14	18/30	18/22		54/75	⊙	-88.698	$1/2^+$	26.4%
		130		2/2	6/6	10/14	18/30	18/24		54/76	○	-89.881	0^+	4.1%
		131 /1		2/2	6/6	10/14	18/30	18/24		54/77	⊙	-88.521	$3/2^+$	21.2%
		132		2/2	6/6	10/14	18/30	18/26		54/78	○	-89.296	0^+	26.9%
		133 /1		2/2	5/7	12/12	18/30	17/27		54/79	⊙	-87.662	$3/2^+$	5.25d(β^-)
		134		2/2	6/6	10/14	18/30	18/28		54/80	○	-88.125	0^+	10.4%
		135 /1		2/2	5/7	10/14	18/30	19/27		54/81	⊙	-86.506	$3/2^+$	9.1h(β^-)
		136		2/2	6/6	10/14	18/30	18/30		54/82	○	-86.425	0^+	8.9%*
		137 /1		2/2	5/7	10/14	18/30	19/29		54/83	⊙	-82.215	$7/2^-$	3.82min(β^-)
Ca	55	130		2/2	6/6	10/14	18/30	19/23		55/75	○	-86.863	1^+	29.2min(ε)
		131 /1		2/2	6/6	10/14	18/30	19/23		55/76	⊙	-88.066	$5/2^+$	9.69d(ε)
		132		2/2	6/6	10/14	18/30	19/25		55/77	○	-87.175	2^-	6.47d(ε)
		133 /1		2/2	5/7	12/12	18/30	18/26		55/78	⊙	-88.089	$7/2^+$	100%
		134		2/2	6/6	10/14	18/30	19/27		55/79	○	-86.909	4^+	2.06y(β^-)
		135 /1		2/2	6/6	10/14	18/30	19/27		55/80	⊙	-87.665	$7/2^+$	3×10^6y(β^-)
		136		2/2	6/6	10/14	18/30	19/29		55/81	○	-86.358	5^+	13.1d(β^-)
		137 /1		2/2	6/6	10/14	18/30	19/29		55/82	⊙	-86.560	$7/2^-$	30.2y(β^-)
		138		2/2	6/6	10/14	18/30	19/31		55/83	○	-82.98	3^-	32.2min(β^-)
Ba	56	127 /1		2/2	5/7	12/12	20/28	17/21		56/71	⊙	-82.783	$(1/2^-)$	12.7min(ε)
		128		2/2	5/7	12/12	18/30	19/21		56/72	○	-85.482	0^+	2.43d(ε)
		129 /1		2/2	5/7	12/12	18/30	19/21		56/73	⊙	-85.046	$1/2^-$	2.2h(ε)
		130		2/2	5/7	10/14	18/30	21/21		56/74	○	-887.303	0^+	0.106%
		131 /1		2/2	5/7	12/12	18/30	19/23		56/75	⊙	-86.726	$1/2^-$	12.0d(β^-)
		132		2/2	6/6	10/14	20/28	28/26		56/76	○	-88.453	0^-	0.101%
		133 /1		2/2	5/7	12/12	18/30	29/25		56/77	⊙	-87.569	$1/2^+$	10.7y(β^-)
		134		2/2	6/6	10/14	18/30	20/26		56/78	○	-88.968	0^+	2.42%
		135 /1		2/2	6/6	10/14	18/30	20/26		56/79	⊙	-87.870	$3/2^+$	6.59%
		136		2/2	6/6	10/14	18/30	20/28		56/80	○	-88.906	0^+	7.85%**
		137 /1		2/2	6/6	10/14	18/30	20/28		56/81	⊙	-87.733	$3/2^+$	11.2%**

* $^{136}_{54}Xe_{82}$ show that *p*/*n*=18/30 is a stable combination of the 5th full shell. The 5th and 6th shells are the same. At the same time it shows the characteristics of magnetic nucleonic pairing between neighboring shells.

** $^{136}_{56}Ba_{80}$ and $^{137}_{56}Ba_{81}$ show that *p*/*n*=18/30 and *p*/*n*=20/28 are stable combinations of the 5th full shell.

	138	2/2	6/6	10/14	18/30	20/30	56/82	○	-88.273	0^+	71.7%
	139 /1	2/2	5/7	12/12	18/30	19/31	56/83	⊙	-84.925	$7/2^-$	82.9min(β^-)
	140	2/2	5/7	10/14	18/30	21/31	56/84	○	-83.285	0^+	12.7d(β^-)
	141 /1	2/2	5/7	10/14	18/30	21/31	56/85	⊙	-79.98	$3/2^-$	18.3min(β^-)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	$T_{1/2}$
La	57	135 /1	2/2	6/6	10/14	18/30	21/25			57/78	⊙	-86.670	$5/2^+$	19.5h(ε)
		136	2/2	6/6	10/14	18/30	21/27			57/79	⊙	-86.04	1^+	9.87min(ε)
		137 /1	2/2	6/6	10/14	18/30	21/27			57/80	⊙	-87.13s	$7/2^+$	6×10^4y(ε)
		138	2/2	5/7	12/12	18/30	20/30			57/81	○	-86.524	5^+	0.089%
		139 /1	2/2	5/7	12/12	18/30	20/30			57/82	⊙	-87.231	$7/2^+$	99.911%
		140	2/2	6/6	10/14	20/28	19/33			57/83	○	-84.320	3^-	40.3h(β^-)
		141 /1	2/2	6/6	10/14	20/28	19/33			57/84	⊙	-83.008	$7/2^+$	3.90h(β^-)
		142	2/2	6/6	10/14	18/30	21/33			57/85	○	-80.018	2^-	91.1min(β^-)
Ce	58	133 /1	2/2	5/7	12/12	18/30	21/33			58/75	⊙	-82.17s	$1/2^+$	5.4h(ε)
		134	2/2	5/7	12/12	18/30	21/25			58/76	○	-84.77s	0^+	76h(ε)
		135 /1	2/2	5/7	12/12	18/30	21/25			58/77	⊙	-84.551	$1/2^+$	17.6h(ε)
		136	2/2	6/6	10/14	20/28	20/28			58/78	○	-86.50	0^+	0.190%
		137 /1	2/2	5/7	12/12	18/30	21/27			58/79	⊙	-85.91s	$3/2^+$	9.0h(ε)
		138	2/2	6/6	10/14	20/28	20/30			58/80	○	-87.565	0^+	0.254%
		139 /1	2/2	5/7	12/12	18/30	21/29			58/81	⊙	-86.966	$3/2^+$	137.2d(ε)
		140	2/2	6/6	10/14	20/28	20/32			58/82	○	-88.081	0^+	88.5%
		141 /1	2/2	5/7	12/12	18/30	21/31			58/83	⊙	-85.438	$7/2^-$	32.5d(β^-)
		142	2/2	6/6	12/14	18/30	22/32			58/84	○	-84.535	0^+	11.1%
		143 /1	2/2	5/7	10/14	20/28	21/33			58/85	⊙	-81.610	$3/2^-$	33.0h(β^-)
		144	2/2	5/7	10/14	18/30	23/33			58/86	○	-80.431	0^+	284d(β)$^-$
		145 /1	2/2	5/7	10/14	18/30	23/33			58/87	⊙	-77.12	$5/2^+$	2.98min(β^-)
Pr	59	138	2/2	6/6	10/14	20/28	21/29			59/79	○	-83.128	1^+	1.45min(ε)
		139 /1	2/2	6/6	10/14	20/28	21/29			59/80	⊙	-84.854	$5/2^+$	4.4h(ε)*
		140	2/2	6/6	10/14	20/28	21/31			59/81	○	-84.693	0^+	3.39min(ε)
		141 /1	2/2	5/7	12/12	18/30	22/30			59/82	⊙	-86.018	$5/2^+$	100%

* $^{139}_{59}Pr_{80}$, through two (ε) decays and exchange of a nucleon with inside shell, generates $^{139}_{57}La_{82}$ and becomes stable. The nucleon exchange between shells is a way of nuclear motion, which however does not affect the stable *p/n* between shells.

** $^{142}_{60}Nd_{82}$ and $^{142}_{58}Ce_{84}$ are similar in nuclide shell strucre, both belonging to“○”category with A=142. But they differ in character because of the *p/n* difference between shells.

		142		2/2	6/6	10/14	20/28	21/33	59/83	○	-83.790	2^-	19.2h(β^-)
		143	/1	2/2	6/6	10/14	20/28	21/33	59/84	⊙	-83.065	$7/2^+$	13.6d(β^-)
		144		2/2	6/6	10/14	20/28	21/35	59/85	○	-80.750	0^-	17.3min(β^-)
Nd	60	139	/1	2/2	5/7	12/12	20/28	21/29	60/79	⊙	-82.05	$3/2^+$	29.7min(ε)
		140		2/2	5/7	12/12	18/30	23/29	60/80	○	-84.22	0^+	3.37d(ε)
		141	/1	2/2	5/7	12/12	18/30	23/29	60/81	⊙	-84.203	$3/2^+$	2.5h(ε)
		142		2/2	6/6	10/14	20/28	22/32	60/82	○	-85.949	0^+	27.2%***
		143	/1	2/2	6/6	10/14	20/28	22/32	60/83	⊙	-84.000	$7/2^-$	12.2%

Shell Structure of Nuclide

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	$T_{1/2}$
		144		2/2	6/6	10/14	20/28	22/34		60/84	○	-83.746	0^+	23.8%
		145	/1	2/2	6/6	10/14	20/28	22/34		60/85	⊙	81.430	$7/2^-$	8.3%
		146		2/2	6/6	10/14	20/28	22/36		60/86	○	-80.923	0^+	17.2%
		147	/1	2/2	5/7	10/14	18/30	23/35		60/87	⊙	-78.144	$5/2^-$	11.0d(β^-)
		148		2/2	6/6	12/12	18/30	24/36		60/88	○	-77.407	0^+	5.7%
		149	/1	2/2	5/7	10/14	20/28	23/37		60/89	⊙	-74.374	$5/2^-$	1.73h(β^-)
		150		2/2	6/6	10/14	18/30	24/38		60/90	○	-73.682	0^+	5.6%
		151	/1	2/2	5/7	10/14	18/30	25/37		60/91	⊙	-70.945	$(3/2^+)$	12.4min(β^-)
		152		2/2	5/7	10/14	18/30	25/39		60/92	○	-70.146	0^+	11.4min(β^-)
Pm	61	142		2/2	6/6	10/14	20/28	23/31		61/81	○	-81.06	1^+	40.5s(ε)*
		143	/1	2/2	6/6	10/14	20/28	23/31		61/82	⊙	-82.959	$5/2^+$	265d(ε)
		144		2/2	6/6	10/14	20/28	23/33		61/83	○	-81.416	5^-	349d(ε)
		145	/1	2/2	6/6	10/14	20/28	23/33		61/84	⊙	-81.270	$5/2^+$	17.7y(ε)
		146		2/2	6/6	12/12	20/28	23/35		61/85	○	-79.442	3^-	5.5y(ε)**
		147	/1	2/2	6/6	10/14	20/28	23/35		61/86	⊙	-79.040	$7/2^+$	2.62y(β^-)
		148		2/2	6/6	10/14	20/28	23/37		61/87	○	-76.870	1^-	5.37d(β^-)
		149	/1	2/2	6/6	10/14	20/28	23/37		61/88	⊙	-76.063	$7/2^+$	53.1h(β^-)

*Nd and Sm, which neighbor Pm, each have 7 stable isotopes. But Pm does not have a single stable isotope, which can be explained with its *p/n* on outside shells. It seems that the *p/n* of outside shell becomes an even-even combination by the exchange of a nucleon between the 6th and 3rd shells. Even so, this nuclide is not stable. The stable shell structures of Nd and Sm tell us that the *p/n*'s of such nuclides are all even-even combinations except for the first shell. The Pm, after the nucleonic exchange, fails to meet the requirement, so it cannot become a stable nuclide even after the nucleonic exchange between the 6th and 3rdshells.

** $^{146}_{61}Pm_{85}$ should have two ways of decay. It turns into $^{146}_{60}Nd_{86}$ after (ε) decay and becomes $^{146}_{62}Sm_{84}$ after (β^-) decay.

*** $^{146}_{62}Sm_{84}$ decay in the (α) style and its decay procedure is： $^{146}_{62}Sm_{84}$-$^{4}_{2}He_2 \rightarrow {}^{142}_{60}Nd_{82}$。 Now it become stable. There are many such examples. $^{147}_{62}Sm_{85}$ is the same as $^{146}_{62}Sm_{84}$ in the *p/n*'s between shells the first shell But they differ in stability. this example shows that not all even–even nucleons tend to be stable . The $^{146}_{62}Sm_{84}$ is the high filling level of outside shells and it is an even–even combination

		150		2/2	6/6	10/14	18/30	25/37	61/89	○	-73.55	(1^-)	2.68h(β^-)
Sm	62	142		2/2	5/7	12/12	20/28	23/31	62/80	○	-78.978	0^+	72.5min(ε)
		143	/1	2/2	5/7	12/12	20/28	23/31	62/81	⊙	-79.511	$3/2^+$	8.83min(ε)
		144		2/2	6/6	10/14	20/28	24/32	62/82	○	-81.964	0^+	3.1%
		145	/1	2/2	5/7	12/12	20/28	23/33	62/83	⊙	-80.656	$7/2^-$	340d(ε)
		146		2/2	6/6	10/14	20/28	24/34	62/84	○	-80.984	0^+	10.3×10^8y(a)***
		147	/1	2/2	6/6	10/14	20/28	24/34	62/85	⊙	-79.265	$7/2^-$	15.1%***
		148		2/2	6/6	10/14	20/28	24/36	62/86	○	-79.335	0^+	11.3%
		149	/1	2/2	6/6	10/14	20/28	24/36	62/87	⊙	-77.135	$7/2^-$	13.9%
		150		2/2	6/6	10/14	18/30	26/36	62/88	○	-77.049	0^+	7.4%
		151	/1	2/2	5/7	12/12	18/30	25/37	62/89	⊙	-74.574	$5/2^-$	90y(β^-)
		152		2/2	6/6	10/14	18/30	26/38	62/90	○	-74.761	0^+	26.6%

Shell Structure of Nuclides

Nuclide	**Z**	**A**	**Shell Structure of Nucleon(*p/n*)**							**ΣP / n**	**King of Structure**	**Binding Energy Δ (MeV)**	1^π	**$T_{1/2}$**
			1	**2**	**3**	**4**	**5**	**6**	**7**					
		153	/1	2/2	5/7	12/12	18/30	25/39		62/91	⊙	-72.557	$3/2^+$	46.8h(β^-)
		154		2/2	6/6	10/14	18/30	26/40		62/92	○	-72.454	0^+	22.6%
		155	/1	2/2	5/7	10/14	18/30	27/39		62/93	⊙	-70.196	$3/2^-$	22.4min(β^-)
Eu	63	148		2/2	6/6	10/14	18/30	25/35		93/85	○	-76.235	5^-	54.5d(ε)
		149	/1	2/2	6/6	10/14	20/28	25/35		63/86	⊙	-76.439	$5/2^+$	93.1d(ε)
		150		2/2	6/6	10/14	20/28	27/35		63/87	○	-74.756	0^-	36y(ε)
		151	/1	2/2	5/7	12/12	18/30	26/36		63/88	⊙	-74.650	$5/2^+$	47.9%
		152		2/2	6/6	10/14	18/30	27/37		63/89	○	-72.884	3^-	13y(ε)
		153	/1	2/2	5/7	12/12	18/30	26/38		63/90	⊙	-73.363	$5/2^+$	52.1%
		154		2/2	6/6	10/14	18/30	27/39		63/91	○	-71.726	0^+	8.5y(β^-)
		155	/1	2/2	6/6	10/14	18/30	27/39		63/92	⊙	-71.825	$5/2^+$	4.9y(β^-)
		156		2/2	6/6	10/14	18/30	27/41		63/93	○	-70.083	$7/2^-$	15d(β^-)
		157	/1	2/2	6/6	10/14	18/30	27/41		63/94	⊙	-69.465	0^+	15h(β^-)
Gd	64	149	/1	2/2	5/7	12/12	18/30	27/33		64/85	⊙	-75.131	$3/2^-$	9.4d(ε)
		150		2/2	6/6	10/14	18/30	28/34		64/86	○	-75.765	0^+	1.8×10^6y(α)
		151	/1	2/2	5/7	12/12	18/30	27/35		64/87	⊙	-74.168	$3/2^-$	120d(ε)
		152		2/2	6/6	10/14	18/30	28/36		64/88	○	-74.703	0^+	0.20%
		153	/1	2/2	6/6	12/12	18/30	27/37		64/89	⊙	-73.119	$3/2^-$	242d(ε)
		154		2/2	6/6	10/14	18/30	28/38		64/90	○	-73.704	0^+	2.1%
		155	/1	2/2	6/6	10/14	18/30	28/38		64/91	⊙	-72.071	$3/2^-$	14.8%
		156		2/2	6/6	10/14	18/30	28/40		64/92	○	-72.536	0^+	20.6%
		157	/1	2/2	5/7	10/14	18/30	28/40		64/93	⊙	-70.825	$3/2^-$	15.7%
		158		2/2	6/6	10/14	18/30	28/42		64/94	○	-70.691	0^+	24.8%
		159	/1	2/2	5/7	12/12	18/30	27/43		64/95	⊙	-68.562	$3/2^-$	18.6h(β^-)
		160		2/2	6/6	10/14	20/28	26/46		64/96	○	-67.943	0^+	21.8%*

		161	/1	2/2	6/6	12/12	18/30	27/45	64/97	⊙	-65.507	$5/2^-$	3.7min(β^-)
Tb	65	156		2/2	6/6	10/14	18/30	29/39	65/91	○	-70.098	3^-	5.34d(ε)
		157	/1	2/2	6/6	10/14	18/30	29/39	65/92	⊙	-70.767	$3/2^+$	150y(ε)
		158		2/2	6/6	10/14	18/30	29/41	65/93	○	-69.475	3^-	150y(ε)
		159	/1	2/2	5/7	12/12	18/30	28/42	65/94	⊙	-69.536	$3/2^+$	100%
		160		2/2	6/6	10/14	20/28	27/45	65/95	○	-67.840	3^-	72.1d(β^-)
		161	/1	2/2	6/6	10/14	20/28	27/45	65/96	⊙	-67.466	$3/2^+$	6.90d(β^-)
		162		2/2	5/7	12/12	18/30	28/44	65/97	○	-65.76	1^-	7.76min(β^-)
Dy	66	153	/1	2/2	5/7	12/12	18/30	29/35	66/87	⊙	-69.155	$7/2^-$	6.4h(ε)
		154		2/2	6/6	10/14	18/30	30/36	66/88	○	-70.392	0^+	3×10^6y(α)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*)								King of Structure	Binding Energy	1^π	$T_{1/2}$
			1	2	3	4	5	6	7	ΣP / n				
		155	/1	2/2	5/7	12/12	18/30	29/37		66/89	⊙	-69.157	$3/2^-$	10.0h(ε)
		156		2/2	6/6	10/14	20/28	28/40		66/90	○	-70.527	0^+	0.057%
		157	/1	2/2	5/7	12/12	18/30	29/39		66/91	⊙	-69.425	$3/2^-$	8.1 h(ε)
		158		2/2	6/6	10/14	20/28	28/42		66/92	○	-70.410	0^+	0.100%
		159	/1	2/2	5/7	12/12	18/30	29/41		66/93	⊙	-69.171	$3/2^-$	144.4d(ε)
		160		2/2	6/6	10/14	20/28	28/44		66/94	○	-69.674	0^+	2.3%*
		161	/1	2/2	6/6	10/14	20/28	28/44		66/95	⊙	-68.056	$5/2^+$	19.09%*
		162		2/2	5/7	12/12	18/30	28/44	1/1	66/96	○	-68.181	0^+	25.5%**
		163	/1	2/2	5/7	12/12	18/30	28/44	1/1	66/97	⊙	-66.382	$5/2^-$	24.9%
		164		2/2	6/6	10/14	18/30	28/44	2/2	66/98	○	-65.967	0^+	28.1%
		165	/1	2/2	5/7	12/12	18/30	28/44	1/3	66/99	⊙	-63.611	$7/2^+$	2.33h(β^-)
		166		2/2	5/7	10/14	18/30	28/44	2/4	66/100	○	-62.583	0^+	81.6h(β^-)
Ho	67	162		2/2	5/7	12/12	18/30	28/44	2/	67/95	○	-66.047	1^+	15min(ε)
		163	/1	2/2	5/7	12/12	18/30	28/44	2/	67/96	⊙	-66379	$(7/2)^-$	33y(ε)
		164		2/2	6/6	10/14	18/30	28/44	3/1	67/97	○	-64.937	1^+	29.0 min(ε)
		165	/1	2/2	5/7	12/12	18/30	28/44	2/2	67/98	⊙	--64.896	$7/2^-$	100%
		166		2/2	5/7	12/12	18/30	28/44	2/4	67/99	○	-63.007	0^-	26.8h(β^-)
		167	/1	2/2	5/7	12/12	18/30	28/44	2/4	67/100	⊙	-62.316	$(7/2^-)$	3.1h(β^-)
Er	68	160		2/2	6/6	12/12	20/28	28/44		68/92	○	-66.052	0^+	28.6h(ε)***
		161	/1	2/2	6/6	12/12	20/28	28/44		68/93	⊙	-65.197	$3/2^-$	3.24h
		162		2/2	5/7	12/12	20/28	28/44	1/1	68/94	○	-66.335	0^+	0.14%
		163	/1	2/2	6/6	10/14	20/28	28/44	2/	68/95	⊙	-65.168	$5/2^-$	75.1min(ε)
		164		2/2	6/6	10/14	20/28	28/44	2/2	68/96	○	-65.940	0^+	1.56%
		165	/1	2/2	5/7	12/12	18/30	28/44	3/1	68/97	⊙	-65.518	$5/2^-$	10.4h(ε)
		166		2/2	5/7	12/12	18/30	28/44	3/3	68/98	○	-64.921	0^+	33.4%
		167	/1	2/2	5/7	12/12	18/30	28/44	3/3	68/99	⊙	-63.286	$7/2^+$	22.9%
		168		2/2	6/6	10/14	20/28	26/46	4/4	68/100	○	-62.985	0^+	27.1%****

*The stability of $^{160}_{64}Gd_{96}$ tells us that the *p/n*=26/46 is a stable combination of the 6th full shell.

	169	/1	2/2	5/7	12/12	18/30	28/44	3/5	68/101	⊙	-60.917	$1/2^-$	9.40d(β^-)
	170		2/2	5/7	12/12	18/30	26/46	5/5	68/102	○	-60.104	0^+	14/9%
	171	/1	2/2	6/6	10/14	20/28	26/46	4/6	68/103	⊙	-57.714	$5/2^-$	7.52h(β^-)
	172		2/2	5/7	12/12	18/30	26/46	5/7	68/104	○	-56.491	0^+	49.3h(β^-)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	$T_{1/2}$
			1	2	3	4	5	6	7					
Tm	69	166		2/2	5/7	12/12	18/30	28/44	4/2	69/97	○	-61.874	2^+	7.0h(ε)
		167	/1	2/2	5/7	12/12	18/30	28/44	4/2	69/98	⊙	-65.537	$1/2^+$	9.25d(ε)
		168		2/2	6/6	10/14	18/30	28/44	5/3	69/99	○	-61.306	3^+	93.1d(ε)
		169	/1	2/2	5/7	12/12	18/30	28/44	4/4	69/100	⊙	-61.2669	$1/2^+$	100%
		170		2/2	5/7	12/12	18/30	28/44	4/6	69/101	○	-59.791	1^-	128.6d(β^-)
		171	/1	2/2	5/7	12/12	18/30	28/44	4/6	69/102	⊙	-59.205	$1/2^+$	1.92y(β^-)
		172		2/2	6/6	10/14	18/30	28/44	5/7	69/103	○	-57.380	2^-	63.6h(β^-)
Yb	70	166		2/2	6/6	10/14	20/28	28/44	4/2	70/96	○	-61.582	0^+	56.7h(ε)
		167	/1	2/2	6/6	10/14	20/28	28/44	4/2	70/97	⊙	60.583	$5/2^-$	17.5min(ε)
		168		2/2	6/6	10/14	20/28	28/44	4/4	70/98	○	-61.565	0^+	0.135%
		169	/1	2/2	5/7	12/12	18/30	28/44	5/3	70/99	⊙	-60.361	$7/2^+$	32.0d(ε)
		170		2/2	5/7	12/12	18/30	28/44	5/5	70/100	○	-60.759	0^+	3.1%
		171	/1	2/2	5/7	12/12	18/30	28/44	5/5	70/101	⊙	-59.302	$1/2^-$	14.4%
		172		2/2	6/6	10/14	20/28	26/46	6/6	70/102	○	-59.250	0^+	21.9%
		173	/1	2/2	6/6	10/14	20/28	26/46	6/6	70/103	⊙	-57.546	$5/2^-$	16.2%
		174		2/2	5/7	12/12	18/30	26/46	7/7	70/104	○	-59.940	0^+	31.6%
		175	/1	2/2	6/6	10/14	20/28	26/46	6/8	70/105	⊙	-54.691	$7/2^-$	4.19d(β^-)
		176		2/2	6/6	10/14	18/30	26/46	8/8	70/106	○	-53.490	0^+	12.6%
		177	/1	2/2	5/7	12/12	18/30	26/46	7/9	70/107	⊙	-50.986	$9/2^+$	1.9h(β^-)
		178		2/2	6/6	10/14	18/30	26/46	8/10	70/108	○	-49.66	0^+	74min
Lu	71	172		2/2	6/6	10/14	18/30	28/44	7/5	71/101	○	-56.726	(4^-)	6.70d(ε)
		173	/1	2/2	6/6	10/14	18/30	28/44	7/5	71/102	⊙	-56.871	$7/2^+$	1.37y(ε)
		174		2/2	5/7	12/12	18/30	26/46	8/6	71/103	○	-55.562	1^-	3.3y(ε)
		175	/1	2/2	6/6	10/14	20/28	26/46	7/7	71/104	⊙	-55.459	$7/2^+$	97.39%

* ${}^{160}_{66}Dy_{94}$ and ${}^{161}_{66}Dy_{95}$ are respectively even-*A* 6shelled nuclide, showing that *p/n*=28/44 is a stable combination of the 6th full shell.

** ${}^{162}_{66}Dy_{96}$and ${}^{162}_{67}Ho_{95}$ clearly bears the characteristics of a 7-shell structure.

*** ${}^{160}_{68}Er_{92}$ is a 6-shell nuclide of the "○"category. All the *p/n*'s are in agreement with the stable *p/n* combination, but they are all "I"combination. This shows that the nuclide composed of nothing but full protons are not stable. After two (ε) decays it generates ${}^{160}_{66}Dy_{94}$ and becomes stable.

**** ${}^{168}_{68}Er_{100}$ shows that the *p/n* =26/46 is a stable combination of the 6th full shell. Similar nuclide ${}^{170}_{68}Er_{102}$, ${}^{172}_{70}Yb_{102}$, ${}^{173}_{70}Yb_{103}$, etc.

		176		2/2	5/7	12/12	18/30	26/46	8/8	71/105	○	-53.381	7^-	2.61%
		177	/1	2/2	6/6	10/14	18/30	28/44	7/9	71/106	⊙	52.382	$7/2^+$	6.71d(β^-)
		178		2/2	5/7	12/12	18/30	26/46	8/10	71/107	○	-50.30	1^+	28.4min(β^-)
Hf	72	171	/1	2/2	6/6	10/14	20/28	28/44	6/4	72/99	⊙	-55.30_S	$(7/2^+)$	12.1h(ε)
		172		2/2	5/7	12/12	18/30	28/44	7/5	72/100	○	-56.33_S	0^+	1.87y(ε)
		173	/1	2/2	5/7	12/12	18/30	28/44	7/5	72/101	⊙	-55.27_S	$1/2^-$	24.0h(ε)
		174		2/2	5/7	12/12	18/30	28/44	7/7	72/102	○	55.830	0^+	0.16%
		175	/1	2/2	6/6	10/14	20/28	26/46	8/6	72/103	⊙	-54.548	$5/2^-$	70d(ε)
		176		2/2	6/6	10/14	20/28	26/46	8/8	72/104	○	-54.567	0^+	5.2%
		177	/1	2/2	6/6	10/14	20/28	26/46	8/8	72/105	⊙	-52.879	$7/2^-$	18.6%
		178		2/2	5/7	12/12	18/30	26/46	9/9	72/106	○	-52.434	0^+	27.1%
		179	/1	2/2	5/7	12/12	18/30	26/46	9/9	72/107	⊙	-50.462	$9/2^-$	13.7%
		180		2/2	6/6	10/14	18/30	26/46	10/10	72/108	○	-49.779	0^+	35.2%

Shell Structure of Nuclides

Nuclide	**Z**	**A**	**Shell Structure of Nucleon(*p*/*n*)**								**King of Structure**	**Binding Energy Δ (MeV)**	1^π	$T_{1/2}$
			1	**2**	**3**	**4**	**5**	**6**	**7**	**ΣP / n**				
		181	/1	2/2	5/7	12/12	18/30	26/46	9/11	72/109	⊙	-47.403	1/2+	42.4d(β^-)
		182		2/2	6/6	10/14	18/30	26/46	10/12	72/110	○	-45.99	0+	9×106y(β^-)
		183	/1	2/2	6/6	10/14	18/30	26/46	10/12	72/111	⊙	-43.269	(3/2-)	64min(β^-)
Ta	73	178		2/2	5/7	12/12	18/30	26/46	10/8	73/105	○	-50.52	1+	9.31min (ε)
		179	/1	2/2	5/7	12/12	18/30	26/46	10/8	73/106	⊙	-50.347	(7/2+)	655d(ε)
		180		2/2	5/7	12/12	18/30	26/46	10/10	73/107	○	-48.941	1+	0.0123%
		181	/1	2/2	5/7	12/12	18/30	26/46	10/10	73/108	⊙	-48.425	7/2+	99.9877%
		182		2/2	5/7	12/12	18/30	26/46	10/12	73/109	○	-46.417	0+	115d(β^-)
		183	/1	2/2	5/7	12/12	18/30	28/44	10/12	73/110	⊙	-45.279	7/2+	5.1d(β^-)
W	74	178		2/2	6/6	10/14	18/30	28/44	10/8	74/104	○	-50.43	0+	21.5d(β^-)
		179	/1	2/2	6/6	10/14	18/30	28/44	10/8	74/105	⊙	-49.283	(7/2-)	28min(ε)
		180		2/2	6/6	10/14	18/30	28/44	10/10	74/106	○	-49.624	0+	0.13%
		181	/1	5/7	5/7	12/12	18/30	16/22	11/9	74/107	⊙	-48.237	9/2+	121d(ε)
		182		5/7	5/7	12/12	18/30	26/46	11/11	74/108	○	-48.228	0+	26.3d%
		183	/1	5/7	5/7	12/12	18/30	26/46	11/11	74/109	⊙	-46.347	1/2-	14.3%
		184		2/2	6/6	10/14	18/30	26/46	12/12	74/110	○	-45.687	0+	30.7%
		185	/1	2/2	5/7	12/12	18/30	26/46	11/13	74/111	⊙	-43.370	3/2-	75.1d(β^-)
		186		2/2	5/7	10/14	18/30	26/46	13/13	74/112	○	-42.498	0+	28.6%
		187	/1	2/2	6/6	10/14	18/30	26/46	12/14	74/113	⊙	-39.893	3/2-	23.9h(β^-)
		188		2/2	5/7	10/14	18/30	26/46	13/15	74/114	○	-38.657	0+	69.4d(β^-)
e	75	182		2/2	5/7	12/12	18/30	26/46	12/10	75/107	○	-45.43s	2+	12.7h(ε)
		183	/1	2/2	5/7	12/12	18/30	26/46	12/10	75/108	⊙	-45.791	(5/2)+	71d(β^-)
		184		2/2	6/6	10/14	18/30	26/46	13/11	75/109	○	-44.191	3-	38d(ε)
		185	/1	2/2	5/7	12/12	18/30	26/46	12/12	75/110	⊙	-43.802	5/2+	37.4%

		186	2/2	5/7	12/12	18/30	26/46	12/14	75/111	○	-41.910	1-	90.6h(β^-)
		187 /1	2/2	6/6	10/14	18/30	26/46	13/13	75/112	⊙	-41.205	5/2+	62.60%
		188	2/2	6/6	10/14	18/30	26/46	13/15	75/113	○	-39.006	1-	16.9h(β^-)
		189 /1	2/2	6/6	10/14	18/30	26/46	13/15	75/114	⊙	-37.970	(5/2)+	24.3h(β^-)
Os	76	182	2/2	6/6	10/14	18/30	26/46	12/10	76/106	○	-44.58s	0+	21.5h(ε)
		183 /1	2/2	6/6	10/14	18/30	26/46	12/10	76/107	⊙	-43.49s	(9/2)+	13.0h(ε)
		184	2/2	6/6	10/14	18/30	26/46	13/12	76/108	○	-44.233	0+	0.018%
		185 /1	2/2	5/7	12/12	18/30	26/46	13/11	76/109	⊙	-42.787	1/2-	93.6d(ε)
		186	2/2	5/7	12/12	18/30	26/46	13/13	76/110	○	42.987	0+	1.6%
		187 /1	2/2	5/7	12/12	18/30	26/46	14/13	76/111	⊙	-41.208	1/2-	1.6%
		188	2/2	6/6	10/14	18/30	26/46	14/14	76/112	○	-41.125	0+	13.3%
		189 /1	2/2	6/6	10/14	18/30	26/46	14/14	76/113	⊙	-38.978	3/2-	16.1%
		190	2/2	5/7	10/14	18/30	26/46	15/15	76/114	○	-38.699	0+	26.4%

Shell Structure of Nuclides

Nuclide	**Z**	**A**	**Shell Structure of Nucleon(*p/n*)**								**King of Structure**	**Binding Energy Δ (MeV)**	1^{π}	**$T_{1/2}$**
			1	**2**	**3**	**4**	**5**	**6**	**7**	**ΣP / n**				
		191	/1	2/2	6/6	10/14	18/30	26/46	14/16	76/115	⊙	-36.388	$9/2^-$	15.4d(β^-)
		192		2/2	6/6	10/14	18/30	26/46	14/18	76/116	○	-35.875	0^+	41.0%
		193	/1	2/2	5/7	10/14	18/30	26/46	15/17	76/117	⊙	-33.387	$3/2^-$	30.6h(β^-)
		194		2/2	5/7	10/14	18/30	26/46	15/19	76/118	○	-32.417	0^+	6.0y(β^-)
Ir	77	188		2/2	6/6	10/14	18/30	26/46	15/13	77/111	○	-38.323	(2^-)	41.5h(ε)
		189	/1	2/2	6/6	10/14	18/30	26/46	15/13	77/112	⊙	-38.48s	$3/2^+$	13.1d(ε)
		190		2/2	5/7	10/14	18/30	26/46	16/14	77/113	○	-36.70	(4^+)	11.8d(ε)
		191	/1	2/2	6/6	10/14	18/30	26/46	15/15	77/114	⊙	-36.698	$3/2^+$	37.3%
		192		2/2	6/6	10/14	18/30	26/46	15/17	77/115	○	-34.826	4^-	74.2d(β^-)
		193	/1	2/2	5/7	10/14	18/30	26/46	16/16	77/116	⊙	-34.519	$3/2^+$	62.7%
		194		2/2	5/7	10/14	18/30	26/46	16/18	77/117	○	-32.514	1^-	19.2h(β^-)
		195	/1	2/2	5/7	10/14	18/30	26/46	16/18	77/118	⊙	-31.692	$(3/2^+)$	2.8h(β^-)
Pt	78	187	/1	2/2	6/6	10/14	20/28	26/46	14/12	78/109	⊙	-36.81s	$3/2^-$	2.35h(ε)
		188		2/2	5/7	12/12	18/30	26/46	15/13	78/110	○	37.788	0^+	10.2d(ε)
		189	/1	2/2	5/7	12/12	18/30	26/46	15/13	78/111	⊙	-36.57s	$3/2^-$	10.9h(ε)
		190		2/2	5/7	12/12	18/30	26/46	15/15	78/112	○	-37.318	0^+	0.013%
		191	/1	2/2	6/6	10/14	18/30	26/46	16/14	78/113	⊙	-35.698	$3/2^-$	2.9d(ε)
		192		2/2	6/6	10/14	18/30	26/46	1616	78/114	○	-36.283	0^+	0.78%
		193	/1	2/2	5/7	10/14	18/30	26/46	17/15	78/115	⊙	-34.458	$(1/2^-)$	50y(ε)
		194		2/2	5/7	10/14	18/30	26/46	17/17	78/116	○	-34.756	0^+	32.9%
		195	/1	2/2	5/7	10/14	18/30	26/46	17/17	78/117	⊙	-32.802	$1/2^-$	33.8%
		196		2/2	6/6	10/14	18/30	26/46	16/20	78/118	○	32.652	0^+	25.3%
		197	/1	2/2	5/7	10/14	18/30	26/46	17/19	78/119	⊙	-30.431	$1/2^-$	18.3h(β^-)
		198		2/2	6/6	10/14	18/30	26/46	16/22	78/120	○	-29.921	0^+	7.2%

		199	/1	2/2	5/7	10/14	18/30	26/46	17/21	78/121	⊙	-27.420	$(5/2^-)$	30.8min(β^-)
		200		2/2	5/7	10/14	20/28	26/46	15/25	78/122	○	-26.60s	0^+	12.5h(β^-)
Au	79	194		2/2	5/7	10/14	18/30	26/46	18/16	79/115	○	-32.256	1^-	39.5h(ε)
		195	/1	2/2	5/7	10/14	18/30	26/46	18/16	79/116	⊙	-32.572	$3/2^+$	186d(ε)
		196		2/2	6/6	10/14	18/30	26/46	17/19	79/117	○	-31.162	2^-	6.18d(ε)
		197	/1	2/2	5/7	10/14	18/30	26/46	18/18	79/118	⊙	-31.150	$3/2^+$	100%
		198		2/2	5/7	10/14	18/30	26/46	18/20	79/119	○	-29.591	2^-	2.696d(β^-)
		199	/1	2/2	5/7	10/14	18/30	26/46	15/20	79/120	⊙	-29.104	$3/2^+$	3.14d(β^-)
		200		2/2	6/6	10/14	20/28	26/46	15/25	79/121	○	-27.30	1^-	48.4min(β^-)
Hg	80	193	/1	2/2	5/7	12/12	18/30	26/46	17/15	80/113	⊙	-31.02s	$3/2^-$	3.8h(ε)
		194		2/2	6/6	10/14	18/30	26/46	18/16	80/114	○	-32.206	0^+	520y(ε)
		195	/1	2/2	6/6	10/14	18/30	26/46	18/16	80/115	⊙	-31.05	$1/2^-$	9.5h(ε)
		196		2/2	6/6	10/14	18/30	26/46	18/18	80/116	○	-31.846	0^+	0.15%

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*)							ΣP / n	King of Structure	Binding Energy Δ(MeV)	1^π	$T_{1/2}$
			1	2	3	4	5	6	7					
		197	/1	2/2	5/7	10/14	18/30	26/46	19/17	80/117	⊙	-30.725	$1/2^-$	64.1h(ε)
		198		2/2	5/7	10/14	18/30	26/46	19/19	80/118	○	-30.964	0^+	10.0%
		199	/1	2/2	5/7	10/14	18/30	26/46	19/19	80/119	⊙	-29.557	$1/2^-$	16.8%
		200		2/2	6/6	10/14	20/28	26/46	16/24	80/120	○	-29.514	0^+	23.1%
		201	/1	2/2	6/6	10/14	20/28	26/46	16/24	80/121	⊙	-27.672	$3/2^-$	13.2%
		202		2/2	6/6	10/14	20/28	26/46	16/26	80/122	○	-27.356	0^+	29.8%
		203	/1	2/2	5/7	12/12	18/30	26/46	17/25	80/123	⊙	-25.277	$5/2^-$	46.6d(β^-)
		204		2/2	6/6	10/14	18/30	26/46	18/26	80/124	○	-24.703	0^+	6.9%
		205	/1	2/2	5/7	12/12	18/30	26/46	17/27	80/125	⊙	-22.299	$1/2^-$	5.2min(β^-)
T1	81	200		2/2	6/6	10/14	20/28	26/46	17/23	81/119	○	-27.060	2^-	26.1h(ε)
		201	/1	2/2	6/6	10/14	20/28	26/46	17/23	81/120	⊙	-27.185	$1/2^+$	73h(ε)
		202		2/2	6/6	10/14	20/28	26/46	17/25	81/121	○	-25.988	2^-	12.2d(ε)
		203	/1	2/2	5/7	12/12	18/30	26/46	18/24	81/122	⊙	-25.769	$1/2^+$	29.5%
		204		2/2	6/6	10/14	20/28	26/46	17/27	81/123	○	-24.353	2^-	3.77y(β^-)
		205	/1	2/2	5/7	12/12	18/30	26/46	18/26	81/124	⊙	-23.837	$1/2^+$	70.5%
		206		2/2	6/6	10/14	20/28	26/46	17/29	81/125	○	-22.269	0^-	4.20min(β^-)
Pb	82	201	/1	2/2	5/7	12/12	18/30	28/44	17/23	82/119	⊙	-25.327	$5/2^-$	9.3h(ε)
		202		2/2	5/7	12/12	18/30	28/44	17/25	82/120	○	-25.942	0^+	5.0×10^4y(ε)
		203	/1	2/2	5/7	12/12	18/30	28/44	17/25	82/121	⊙	-24.794	$5/2^-$	51.9h(ε)*
		204		2/2	6/6	10/14	20/28	26/46	18/26	82/122	○	-25.117	0^+	1.42%

*For $^{203}_{82}Pb_{121}$ and $^{205}_{82}Pb_{123}$, the *p/n*'s are respectively 17/25 and 17/27.After absorbing an electron and exchanging nucleons with 6th shell, they turn into $^{203}_{81}TI_{122}$and $^{205}_{81}TI_{124}$, tending to be stable.

** $^{209}_{83}Bi_{126}$ is a stable nuclide with *p/n*=20/28.It shows that *p/n*=5/7, *p/n*=10/14and *p/n*=20/28 is a stable combination of interaction of interaction between protons and neutrons.

		205	/1	2/2	5/7	12/12	18/30	28/44	17/27	82/123	⊙	-23.777	$5/2^-$	5.0×10^7y(ε)
		206		2/2	6/6	10/14	20/28	26/46	18/28	82/124	○	-23.795	0^+	24.1%
		207	/1	2/2	6/6	10/14	20/28	26/46	18/28	82/125	⊙	-22.463	$1/2^-$	22.1%
		208		2/2	6/6	10/14	20/28	26/46	18/30	82/126	○	-21.759	0^+	52.3%
		209	/1	2/2	5/7	12/12	18/30	26/46	19/29	82/127	⊙	-17.624	$9/2^+$	3.25h(β^-)
		210		2/2	5/7	12/12	18/30	26/46	19/31	82/128	○	-14.738	0^+	22.3y(β^-)
		211	/1	2/2	5/7	12/12	18/30	26/46	19/31	82/129	⊙	-10.492	（$9/2^+$）	36.1min(β^-)
		212		2/2	5/7	12/12	18/30	26/46	19/33	82/130	○	-7.562	0^+	10.6h(β^-)
Bi	83	206		2/2	6/6	10/14	20/28	26/46	19/27	83/123	○	-20.033	6^+	6.24d(ε)
		207	/1	2/2	6/6	10/14	20/28	26/46	19/27	83/124	⊙	-20.058	$9/2^-$	32y(ε)
		208		2/2	6/6	10/14	20/28	26/46	19/29	83/125	○	-18.879	5^+	3.68×10^5y(ε)
		209	/1		5/7	12/12	18/30	26/46	20/28	83/126	⊙	-18.268	$9/2^-$	100%**
		210			6/6	10/14	20/28	26/46	19/31	83/127	○	-14.801	1^-	5.01d(β^-)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p*/*n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^π	$T_{1/2}$
		211	/1	2/2	5/7	10/14	18/30	26/46	20/30	83/128	⊙	-11.865	$9/2^-$	2.15min(α)
		212		2/2	6/6	10/14	20/28	26/46	19/33	83/129	○	-8.135	1^-	60.6min(β^-)
Po	84	206		2/2	5/7	10/14	18/30	28/44	19/27	84/122	○	-18.190	0^+	8.8d(ε)
		207	/1	2/2	5/7	10/14	18/30	28/44	19/27	84/123	⊙	-17.150	$5/2^-$	5.8h(ε)
		208		2/2	6/6	10/14	20/28	26/46	20/28	84/124	○	-17.475	0^+	2.90y(α)*
		209	/1	2/2	6/6	10/14	20/28	26/46	20/28	84/125	⊙	-16.373	$1/2^-$	10.2y(α)**
		210		2/2	6/6	10/14	20/28	26/46	20/30	84/126	○	-15.963	0^+	138.4d(α)
		211	/1	2/2	6/6	10/14	20/28	26/46	20/30	84/127	⊙	-12.444	$9/2^+$	0.52s(α)
At	85	208		2/2	6/6	10/14	20/28	26/46	21/27	85/123	○	-12.64s	6^+	1.63h(ε)
		209	/1	2/2	6/6	10/14	20/28	26/46	21/27	85/124	⊙	-12.888	$9/2^-$	5.4h(ε)
		210		2/2	6/6	10/14	20/28	26/46	21/29	85/125	○	-11.976	5^+	8.3h(ε)
		211	/1	2/2	6/6	10/14	20/28	26/46	21/29	85/126	⊙	-11.653	$9/2^-$	2.71h(ε)
		212		2/2	6/6	10/14	20/28	26/46	21/31	85/127	○	-8.625	(1^-)	0.31s(α)
		213	/1	2/2	5/7	12/12	18/30	26/46	22/30	85/128	⊙	-6.589	$9/2^-$	0.11μs(α)
Rn	86	207	/1	2/2	5/7	12/12	18/30	28/44	21/25	86/121	⊙	-8.69	$5/2^-$	9.3min(ε)
		210		2/2	5/7	12/12	18/30	28/44	21/29	86/124	○	-9.608	0^+	2.4h(α)***
		211	/1	2/2	5/7	10/14	18/30	28/44	21/29	86/125	⊙	-8.761	$1/2^-$	14.6h(ε)
		212		2/2	6/6	10/14	20/28	26/46	22/30	86/126	○	-8.666	0^+	24min(α)
		218		2/2	6/6	10/14	20/28	26/46	22/36	86/132	○	5.212	0^+	35ms(α)
		222		2/2	6/6	10/14	20/28	26/46	22/40	86/136	○	16.370	0^+	3.82d(α)

* ${}^{208}_{84}Po_{124}$ becomes stable after (α) decay. Its decay procedure is: ${}^{208}_{84}Po_{124} - {}^{4}_{2}He_2 \rightarrow {}^{204}_{82}Po_{122}$.

**The decay procedure of ${}^{209}_{84}Po_{125}$ is: ${}^{209}_{84}Po_{125} - {}^{4}_{2}He_2 \rightarrow {}^{205}_{82}Po_{123} + e \rightarrow {}^{205}_{81}Tl_{124}$, tending to be stable.

*** ${}^{210}_{86}Rn_{124}$ becomes stable after (α) decay and (ε) decay. Its decay procedure is: ${}^{210}_{86}Rn_{124} - {}^{4}_{2}He_2 \rightarrow {}^{206}_{84}Po_{122} + e - {}^{206}_{83}Bi_{123} + e - {}^{206}_{82}Pi_{123} \rightarrow {}^{205}_{82}Pb_{124}$

		224		2/2	5/7	10/14	18/30	26/46	23/41	86/138	○	22.26s	0^+	107min(β^-)
Fr	87	209	/1	2/2	5/7	10/14	18/30	28/44	22/26	87/122	⊙	-3.76s	$9/2^-$	50s(α)
		212		2/2	6/6	10/14	20/28	26/46	23/29	87/125	○	-3.69s	5^+	20min(ε)
		215	/1	2/2	6/6	10/14	20/28	26/46	23/31	87/128	⊙	0.309	$9/2^-$	0.12μs(α)
		220		2/2	5/7	10/14	18/30	26/46	24/36	87/133	○	11.470	1	27.4s(α)
		223	/1	2/2	6/6	10/14	20/28	26/46	23/39	87/136	⊙	18.382	(3/2)	21.8min(β^-)
Ra	88	222		2/2	6/6	10/14	20/28	26/46	24/38	88/134	○	14.312	0^+	38s(α)
		223	/1	2/2	6/6	10/14	20/28	26/46	24/38	88/135	⊙	17.235	$1/2^+$	11.4d(α)
		224		2/2	6/6	10/14	20/28	26/46	24/40	88/136	○	18.813	0^+	3.66d(α)
		225	/1	2/2	5/7	10/14	18/30	26/46	25/39	88/137	⊙	21.987	$(3/2)^+$	14.8d(β^-)
		226		2/2	6/6	10/14	20/28	26/46	24/42	88/138	○	23.666	0^+	1602y(α)
		227	/1	2/2	5/7	10/14	18/30	26/46	25/41	88/139	⊙	27.185	$(3/2^+)$	42min(β^-)
Ac	89	224		2/2	6/6	10/14	20/28	26/46	25/39	89/135	○	20.219	(0^-)	2.9h(ε)
		225	/1	2/2	5/7	12/12	18/30	26/46	26/38	89/136	⊙	21.626	$(3/2^-)$	10.0d(α)

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*) 1	2	3	4	5	6	7	ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	$T_{1/2}$
		226		2/2	6/6	10/14	20/28	26/46	25/41	89/137	○	24.301	(1^-)	29h(β^-)
		227	/1	2/2	6/6	10/14	20/28	26/46	25/41	89/138	⊙	25.850	$3/2^-$	21.77y(β^-)
		228		2/2	6/6	10/14	20/28	26/46	25/43	89/139	○	28.895	(3^+)	6.1h(β^-)
Th	90	228		2/2	6/6	10/14	20/28	26/46	26/42	90/138	○	26.758	0^+	1.91y(α)
		229	/1	2/2	6/6	10/14	20/28	26/46	26/44	90/139	⊙	29.581	$5/2^+$	7300y(α)
		230		2/2	6/6	10/14	20/28	26/46	27/43	90/140	○	30.861	0^+	7.54×10^4y(α)
		231	/1	2/2	5/7	12/12	18/30	26/46	26/46	90/141	⊙	33.812	$5/2^+$	25.52h(β^-)
		232		2/2	6/6	10/14	20/28	26/46	27/45	90/142	○	35.447	0^+	100%*
		233	/1	2/2	5/7	12/12	18/30	26/46	27/41	90/143	⊙	38.732	(1/2+)	22.3min(β^-)
Pa	91	229	/1	2/2	6/6	10/14	20/28	26/46	27/43	91/138	⊙	29.887	$(5/2^+)$	1.4d(ε)
		230		2/2	6/6	10/14	20/28	26/46	28/42	91/139	○	32.166	(2^-)	17.7d(ε)
		231	/1	2/2	5/7	12/12	18/30	26/46	27/45	91/140	⊙	33.423	$(3/2^-)$	3.28×10^4y(α)
		232		2/2	6/6	10/14	20/28	26/46	27/45	91/141	○	35.934	(2^-)	1.31d(β^-)
		233	/1	2/2	6/6	10/14	20/28	26/46	28/24	91/142	⊙	37.487	$(3/2^-)$	27.0d(β^-)
U	92	233	/1	2/2	6/6	10/14	20/28	26/46	28/46	92/141	⊙	36.915	$5/2^+$	1.592×10^5y(α)
		234		2/2	6/6	10/14	20/28	26/46	28/46	92/142	○	38.143	0^+	2.45×10^5y(α)
		235	/1	2/2	6/6	10/14	20/28	26/46	28/44	92/143	⊙	40.916	$7/2^-$	0.720%**
		236		2/2	6/6	10/14	20/28	26/46	28/48	92/144	○	42.442	0^+	2.342×10^7y(α)
		237	/1	2/2	5/7	12/12	18/30	26/46	29/47	92/145	⊙	45.389	$1/2^+$	6.75d(β^-)
		238		2/2	6/6	10/14	20/28	26/46	28/50	92/146	○	47.307	0^+	99.275%**
		239	/1	2/2	5/7	12/12	18/30	26/46	29/49	92/147	⊙	50.572	$5/2^+$	23.5min(β^-)
Np	93	236		2/2	6/6	10/14	20/28	26/46	29/47	93/143	○	43.361	(6^-)	1.1×10^5y(ε)
		237	/1	2/2	5/7	12/12	18/30	26/46	30/46	93/144	⊙	44.869	$5/2^+$	2.14×10^6y(α)
		238		2/2	6/6	10/14	20/28	26/46	29/49	93/145	○	47.453	2^+	2.117d(β^-)
		239	/1	2/2	6/6	10/14	20/28	26/46	29/49	93/146	⊙	49.306	$5/2^+$	2.36d(β^-)
Pu	94	237	/1	2/2	5/7	12/12	18/30	26/46	31/45	94/143	⊙	45.087	$7/2^-$	45.3d(ε)
		238		2/2	6/6	10/14	20/28	26/46	30/48	94/144	○	46.161	0^+	87.74y(α)
		239	/1	2/2	6/6	10/14	20/28	26/46	30/48	94/145	⊙	48.585	$1/2^+$	2.41×10^4y(α)***
		240		2/2	6/6	10/14	20/28	26/46	30/50	94/146	○	50.123	0^+	6570y(α)
		241	/1	2/2	5/7	12/12	18/30	26/46	31/49	94/147	⊙	52.953	$5/2^+$	14.4y(β^-)

* $^{232}_{90}\mathrm{Th}_{142}$ is a stable nuclide with *p/n*=26/46 on outside shells. It is the same as the *p/n* combination of the 6th full shell. It shows that *p/n*=26/46 is a stable combination. $^{236}_{92}\mathrm{U}_{144}$, after (α) decay, generates $^{232}_{90}\mathrm{Th}_{142}$, tending to be stable.

**The protons and neutrons on outside shells of $^{235}_{92}\mathrm{U}_{143}$ and $^{238}_{92}\mathrm{U}_{146}$ are all even-even combinations and are close to the *p/n* of the 6th full shell. Its numbers of protons and neutrons on outside shells are 28 and 50, Dearing the characteristic of "magic number".

*** $^{239}_{94}\mathrm{Pu}_{145}$, after (α) decay, generates $^{235}_{92}\mathrm{U}_{143}$, tending to be stable.

**** $^{242}_{94}\mathrm{Pu}_{148}$, after (α) decay, generates $^{238}_{92}\mathrm{Np}_{146}$, tending to be stable.

	242	2/2	6/6	10/14	20/28	26/46	30/52	94/148	○	54.715	0^+		$3.76 10^5$y(α)****	

Shell Structure of Nuclides

Nuclide	Z	A	Shell Structure of Nucleon(*p/n*)							ΣP / n	King of Structure	Binding Energy Δ (MeV)	1^{π}	$T_{1/2}$
			1	2	3	4	5	6	7					
		243	/1	2/2	5/7	12/12	18/30	26/46	31/51	94/149	⊙	57.752	$7/2^+$	4.96h(β^-)
Am	95	240		2/2	6/6	10/14	20/28	26/46	31/49	95/145	○	51.443	(3^-)	50.9h(ε)
		241	/1	2/2	5/7	12/12	18/30	26/46	32/48	95/146	⊙	52.932	$5/2^-$	433y(α)
		242		2/2	6/6	10/14	20/28	26/46	31/51	95/147	○	55.463	1^-	16.0h(β^-)
		243	/1	2/2	5/7	12/12	18/30	26/46	32/50	95/148	⊙	57.170	$5/2^-$	7370y(α)*
		244		2/2	6/6	10/14	20/28	26/46	31/53	95/149	○	59.877	(6^-)	101h(β^-)
Cm	96	246		2/2	6/6	10/14	20/28	26/46	32/54	96/150	○	56.616	0^+	4700y(α)
		247	/1	2/2	6/6	10/14	20/28	26/46	32/54	96/151	⊙	65.530	$9/2^-$	1.6×10^7y(α)
		248		2/2	6/6	10/14	20/28	26/46	32/56	96/152	○	67.389	0^+	3.4×10^5y(α)
		249	/1	2/2	5/7	12/12	18/30	26/46	33/55	96/153	⊙	70.748	$1/2^+$	64min(β^-)
Bk	97	246		2/2	6/6	10/14	20/28	26/46	33/53	97/149	○	64.02s	2^-	1.8d(ε)
		247	/1	2/2	5/7	12/12	18/30	26/46	34/52	97/150	⊙	65.484	$(3/2^-)$	1380y(α)
Cf	98	251	/1	2/2	6/6	10/14	20/28	26/46	34/56	98/153	⊙	74.127	$1/2^+$	898y(α)
		252		2/2	6/6	10/14	20/28	26/46	34/58	98/154	○	76.031	0^+	2.64y(α)
Es	99	252		2/2	5/7	12/12	18/30	26/46	36/56	99/153	○	77.155	$(4^+,5^-)$	472d(α)
		253	/1	2/2	5/7	12/12	18/30	26/46	36/56	99/154	⊙	79.012	$7/2^+$	20.5d(α)
Fm	100	256		2/2	6/6	10/14	18/30	26/46	38/58	100/156	○	85.481	0^+	2.63h(f)
		257	/1	2/2	6/6	10/14	20/28	26/46	36/60	100/157	⊙	88.588	$(9/2^+)$	100d(α)
Md	101	257	/1	2/2	6/6	10/14	20/28	26/46	37/59	101/156	⊙	89.033	$(7/2^-)$	5.2h(ε)
		258		2/2	5/7	12/12	18/30	26/46	38/60	101/157	○	91.818	(8^-)	55d(α)
No	102	258		2/2	6/6	10/14	18/30	26/46	40/58	102/156	○	91.427	0^+	1.2ms(f)
		259	/1	2/2	6/6	10/14	20/28	26/46	38/60	102/157	⊙	94.012	$9/2^+$	60min(α)
Lr	103	260		2/2	5/7	12/12	18/30	26/46	40/60	103/157	○	98.106		180s(α)
Rf	104	261	/1	2/2	6/6	10/14	20/28	26/46	40/60	104/157	⊙	101.244		65s(α)
Ha	105	261	/1	2/2	5/7	12/12	18/30	26/46	42/58	105/156	⊙	104.16		1.8s(α)

* $^{243}_{95}Am_{148}$, after (α) decay, generates $^{239}_{93}Np_{146}$ .In the course of nuclear reaction of (α) decay, the proton exchange between neighboring shells may take place at the same time. $^{249}_{93}Np_{146}$ after (β^-) decay, generates $^{239}_{94}Pu_{145}$ and again after (α) decay, generates $^{235}_{92}U_{143}$.This process indicates that all nuclides have the tendency of becoming stable, only with different modes of decay, finally generating stable nuclides.

** $^{262}_{106}Ha_{157}$ shows that *p/n* =44/58 is a p/n combination on the 7th full shell. This nuclide decay in (f) style anf the dilect cause lies in the non-matching between full *p/n* and unfull p/n on inside shells. Most of the nuclides with (f) decay bear this feature. $^{261}_{105}Ha_{156}$ decays in (α) way on outside shells because of its good matching between full *p/n* and unfull *p/n*.

*** $^{262}_{107}Bh_{155}$ and $^{263}_{106}Sg_{157}$ accurately display the characteristics of a 7-shelled nuclide.

**** $^{262}_{107}Bh_{155}$ shows that *p/n*=42/60 is a stable p/n combination of the 7th full shell.

		262		2/2	5/7	10/14	18/30	26/46	44/58	105/157	○	105.97	34s(f)**
Sg	106	263	/1	2/2	6/6	10/14	18/30	26/46	44/58	106/157	⊙	110.12	0.8s(f)***
Bh	107	262		2/2	5/7	12/12	18/30	28/44	42/60	107/155	○	114.51	115ms(α)****

Notes:

① The percentage in the table indicates the filling level of the isotopes. (β^-) stands for the (β^-) decay ;(ε) for the rail electronic capture and (β^+)decay;(α) for (α) decay;(f) for spontaneous fission.

② The basic data of the table are taken from: VS Snirley et al, Nuclear Wallet Cards, 1979. KS Krane Introductory Naclear Pnysics, 1987 [8].

③ The basic data of the table are taken from: Nuclear Physics ($P390 \sim P405$),Xu Sida, QingHua University Oress,1992 [9].

④ The stable lists the shell structures of 935 nuclides of the original table. Lost if new nuclides have been discovered by experiments since the table was made. For all the newly-discovered nuclides, their shell structures can be worked out according to the criteria given in this thesis. For an example, $^{213}_{86}Rn_{127:}$

/1	2/2	6/6	10/14	20/28	26/46	22/30	Σ86/127

From its structure we know that it decays in (α) style and the decay product is $^{209}_{84}Po_{125}$.

⑤ Although we have managed to work out the table of shell structures of all known nuclides, the correctness of the table has yet to be verified by lots of experiments. We are sure there are bound to be exceptions. For an example, $^{9}_{5}B_4$ may be a special proton-core nuclide and its structure:

1/	2/2	2/2		Σ:5/4

, This may explain why $^{9}_{5}B_4$ is entirely different in stability form its mirror-image nuclide. $^{9}_{5}Be_4$.