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Model of Nuclear

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Abstract

It is assumed that basis for formutation of all nuclei is a nucleus of helium. All subsequent nuclei of elements consist of chain of nuclei of helium. They are constrained inter se to binding energy equal energy of separation of nucleus of helium. The chain of nuclei of helium coagulates in a ball.

Keywords:* *Nuclonous; Helium; Electrolysis; Calcium; Electrode

Introduction

It is known that the number of nuclonous in a nuclei is multiple four plays a large role at determination of properties of nucleus.

Foremost at the nuclei of containing an even number protons and neutrons spin of nucleus equal to the zero. To this group of elements belong helium ${}^{4}_{2}He$,carbon ${}^{12}_{6}C$, oxygen ${}^{16}_{8}O$. Because the nucleus of helium ${}^{4}_{2}He$ is the simplest, then it serves as basis for the constriction of all anther nuclei. We will consider the chart of formation of nuclei. We will bild a chart for calcium. For this purpose we will define the chain of values of energy of separation of nucleus of helium (α- ${}^{4}_{2}He$) [1-10].

Experimental

Energy of separation α (${}^{8}_{4}Be$)=Binding Energy (${}^{8}_{4}Be$) – BE(${}^{4}_{2}He$) – BE(${}^{4}_{2}He$)=56.500-28.296-28.296=0.092 MeV

ES_{α}(${}^{12}_{6}C$)=BE(${}^{12}_{6}C$) – BE(${}^{8}_{4}Be$) – BE(${}^{4}_{2}He$)=92.163 – 56.500 – 28.296=7.367 MeV

ES_{α}(${}^{16}_{8}O$)=BE(${}^{16}_{8}O$) – BE(${}^{12}_{6}C$) – BE (${}^{4}_{2}He$)=123.621 – 92.163 – 28.296=7.162 MeV

ES_{α}(${}^{20}_{10}Ne$)=BE(${}^{20}_{10}Ne$)-BE(${}^{16}_{8}O$)-BE (${}^{4}_{2}He$)=160.642 – 127.621 – 28.296=4.725 MeV

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$ES_\alpha({}^{24}_{12}Mg)$=BE(${}^{24}_{12}Mg$)-BE(${}^{20}_{10}Ne$)-BE (${}^{4}_{2}He$)=198.260 – 160.642 – 28.296=9.322 MeV

$ES_\alpha({}^{28}_{14}Si)$=BE(${}^{28}_{14}Si$)-BE(${}^{24}_{12}Mg$)-BE (${}^{4}_{2}He$)=236.541 – 198.260 – 28.296=9.985 MeV

$ES_\alpha({}^{32}_{16}S)$=BE(${}^{32}_{16}S$)-BE(${}^{28}_{14}Si$)-BE (${}^{4}_{2}He$)=271.784 – 236.541 – 28.296=6.947 MeV

$ES_\alpha({}^{36}_{18}Ar)$=BE(${}^{36}_{18}Ar$)-BE(${}^{32}_{16}S$)-BE (${}^{4}_{2}He$)=306.721 – 271.784 – 28.296=6.641 MeV

$ES_\alpha({}^{40}_{20}Ca)$=BE(${}^{40}_{20}Ca$)-BE(${}^{36}_{18}Ar$)-BE (${}^{4}_{2}He$)=342.067 – 306.721 – 28.296=7.050 MeV

Let us now construct a chain of ten helium nuclei to obtain core the calcium ${}^{40}_{20}Ca$.

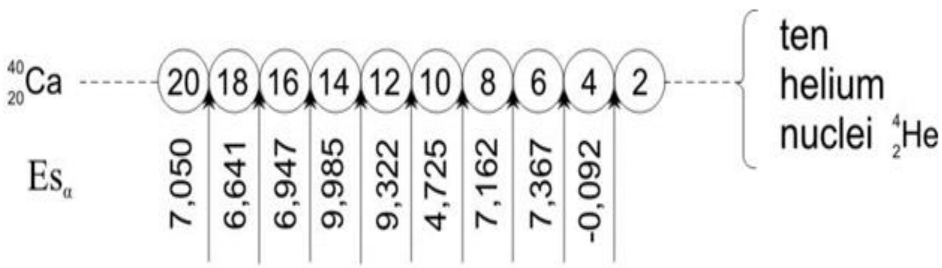

FIG. 1. **BE(${}^{40}_{20}Ca$)=10 * BE (${}^{4}_{2}He$)+9 ES$_\alpha$(1 – 9)=10 * 28.296-+(-0.092)+7.367+7.162+4.725+9.322+9.985+6.947+6.641+7.050=342.067 MeV.**

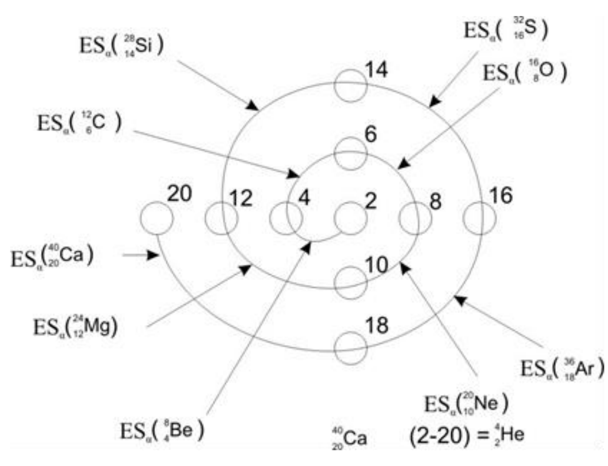

FIG. 2. **This ten nuclei of helium coagulate in a ball.**

Now we will create the table of formation all even nuclei from helium to uranium.

Results and Discussion

In table (picture 1) is presented the variant all even nuclei, since the nucleus of helium $^{4}_{2}He$,ending uranium $^{235}_{92}U$, $^{238}_{92}U$.

Gonrned, used for the constraction of this table following:

Elements consist of chain of nuclei of helium or isotopes of helium, that enter into co-operation. The value of this co-operation is equal to energy of separation of nucleus of helium or isotope of helium from an element.

This energy links the chain of nuclei.

The constructon of nuclei with even number is begun with nucleus of helium, with an odd number a construction is begun with deuterium $^{2}_{1}H$ or tritium $^{3}_{1}H$ .Therefore there are two chains of nuclei.

In lines the numbers against the name elements stand mass of isotopes.

For example:

Element $^{8}_{4}Be$ appears from a nucleus of helium addition of another nucleus,

$$^{9}_{4}Be = ^{4}_{2}He + ^{4}_{2}He$$

or addition of isotope of helium,

$$^{9}_{4}Be = ^{4}_{2}He + ^{5}_{2}He$$

For carbon is brought four isotope $^{15}_{6}C$ $^{14}_{6}C$ $^{13}_{6}C$ $^{12}_{6}C$

The chart of formation of there isotopes is such,

$$^{12}_{6}C = ^{8}_{4}Be + ^{4}_{2}He$$

$$^{13}_{6}C = ^{9}_{4}Be + ^{4}_{2}He$$

$$^{14}_{6}C = ^{9}_{4}Be + ^{6}_{2}He$$

$$^{15}_{6}C = ^{9}_{4}Be + ^{6}_{2}He$$

Another example of formation of isotopes of calcium,

$$Wc \frac{k^{*}Z_{1}^{*}Z_{1}^{*}q^{2}}{R}$$

$$R = \frac{k^{*}Z_{1}^{*}Z_{1}^{*}q^{2}}{W_{c}} = \frac{9^{*}10^{9*}2^{*}50^{*}1,6^{2*}10^{-38}}{1.6^{*}10^{-12}} = \frac{9^{*}1.6^{*}10^{11*}10^{-38}}{10^{-12}}$$

$$^{42}_{20}Ca = ^{38}_{18}Ar + ^{4}_{2}He$$

$$^{43}_{20}Ca = ^{39}_{18}Ar + ^{4}_{2}He$$

$$^{44}_{20}Ca = ^{40}_{18}Ar + ^{4}_{2}He$$

$^{45}_{20}Ca = ^{40}_{18}Ar + ^{4}_{2}He$

$^{46}_{20}Ca = ^{40}_{18}Ar + ^{4}_{2}He$

$^{48}_{20}Ca = ^{40}_{18}Ar + ^{4}_{2}He$

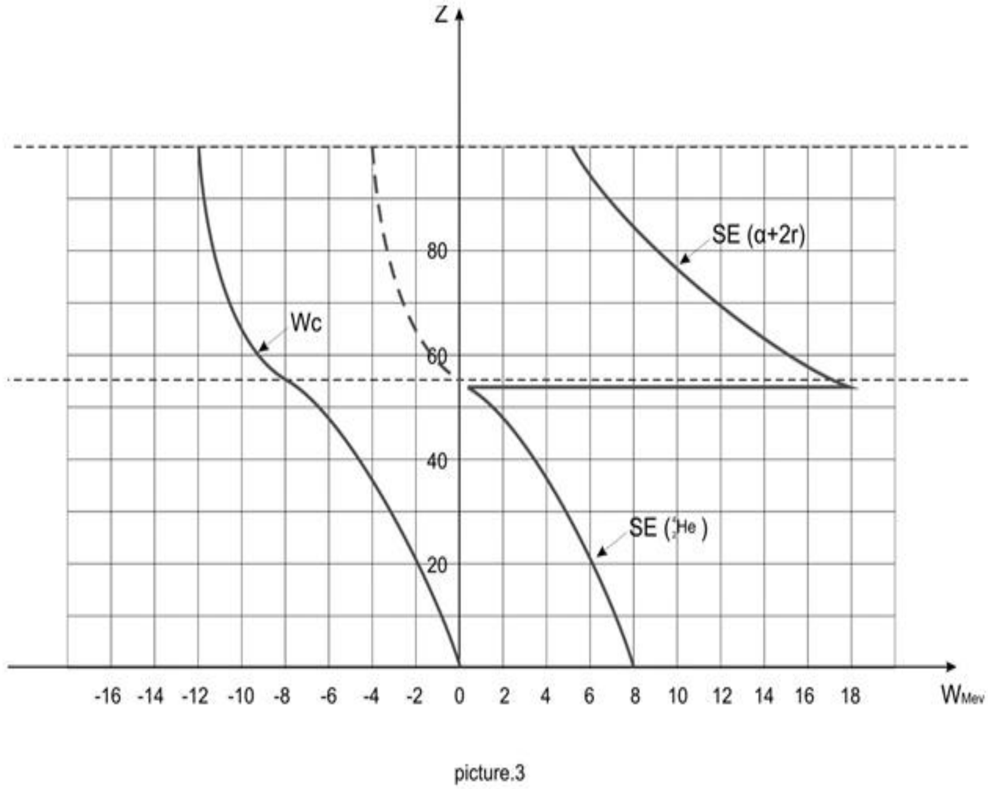

FIG. 3. **For elements from Z=2 to Z=50 this formative element is α-nucleus ($^{4}_{2}He$), as and further from Z=52 to Z=92 this formative element is the isotope of helium $^{6}_{2}He$, because using $^{4}_{2}He$ are caused negative value of energy of separation. On a picture 3 the chart of dependence of energy of separation is presented from Z.**

On a picture 2 a chain is presented from the isotope of helium $^{5}_{2}He$ to uranium $^{235}_{92}U$ .This chain is also distinguished in the table of formation of nucleus (picture 1). Criterion of choice of method of formation of nucleus is a value of energy of separation of element. We find the value of energy of separation (ES_{α}) for all elements from beryllium ($^{8}_{4}Be$) to uranium. If this value is positive, then of nucleus of helium($^{4}_{2}He$) becomes formative, if this value becomes negative then the isotope of helium $^{6}_{2}He$ becomes formative.

In a right side FIG. 1-4 the value of energy of separation (ES_α) $^{4}_{2}He$ and isotope helium $^{6}_{2}He$ is presented from Coo responding clements (TABLE 1).

TABLE 1. **In a right side pictare 2 the value of energy of separation (ESα) and isotope helium is presented from COO responding clements.**

A	Element	Z	ES α	ES (α+2n)	ES {a+1n}	ES {a+3n}
5	He	2				
9	Be	4	2.468			
14	C	6	12.011		19.716	
18	O	8	6.226			
22	Ne	10	9.668			
26	Mg	12	10.517			
30	Si	14	10.65			
36	S	16	9.009	23,820		
40	Ar	18	6.801			
46	Ca	20	11.137	25,960		
50	Ti	22	10.717			
54	Cr	24	7.931			
58	Fe	26	7.65			
65	Ni	28	8.634			29.163
69	Zn	30	5.757			
73	Ge	32	5.304			
77	Se	34	5.72			
81	Kr	36	5.52			
85	Sr	38	6.833			
89	Zr	40	6.191			
93	Mo	42	4.301			
97	Ru	44	1.734			
101	Pd	46	1.741			
105	Cd	48	1.357			
109	Sn	50	0.734			
115	Te	52	-1.46	17.11		
121	Xe	54	-0.199	18.007		
127	Ba	56	-0.009	17.938		
133	Ce	58	-0.217	17.203		
139	Nd	60	-0.209	17.163		
145	Sm	62	-1.115	16.262		
151	Gd	64	-2.653	11.132		
157	Dy	66	-1.036	13.293		
163	Er	68	-1.574	13.241		

169	Yb	70	-1.733	12.791		
175	Hf	72	-2.404	11.708		
181	W	74	2.211	11.266		
187	Os	76	-2.724	10.56		
193	Pt	78	-2.083	10.854		
199	Hg	80	-0.824	12.665		
205	Pb	82	-1.465	6.815		
211	Po	84	-7.534	6.258		
217	Rn	86	-7.887	1.497		
223	Ra	88	-5,973	3.92		
229	Th	90	-5.167	5.253		
235	U	92	-4,678	6.26		

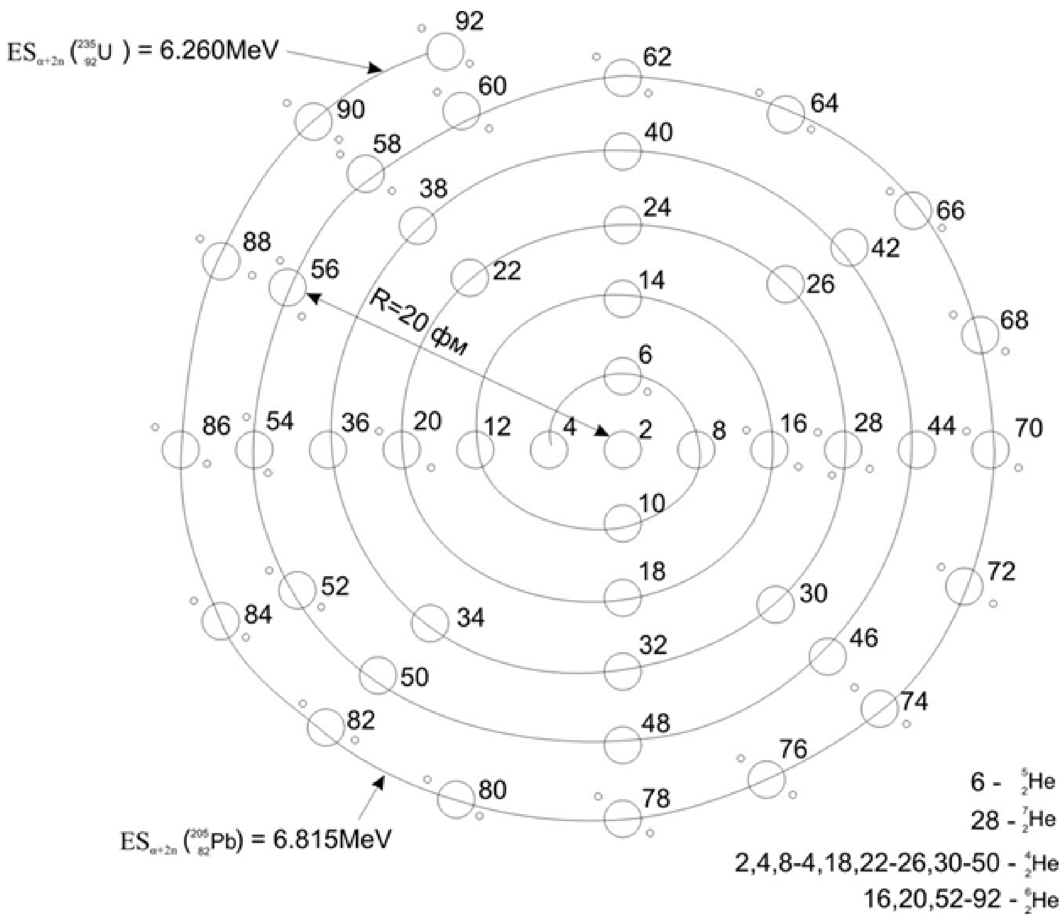

FIG. 4. **Division of nucleus of uranium on two parts making 2/3 basic nucleus devides the break of chain near a nucleus.**

Conclusion

Chain of nuclei convolves in a ball. Similar below. Division of nucleus of uranium on two parts making 2/3 basic nucleus devides the break of chain near a nucleus where ESα goes across through a Zero. Placing of the superfluous no included in a?-nuclei neutrons(n=A-2Z).

Appendix

Table of formation of nuclei

Z		A	→																							
2	He	4	5																							
4	Be	8	9																							
6	C	12	13	14	15																					
8	O	16	17	18																						
10	Ne	20	21	22																						
12	Mg	24	25	26																						
14	Si	28	29	30																						
16	S	32	33	34		36																				
18	Ar	36		38	39	40																				
20	Ca	40		42	43	44	45	46	47	48	49	50														
22	Ti			46	47	48	49	50	51	52	53	54														
24	Cr			50		52	53	54	55	56	57	58														
26	Fe			54		56	57	58	59	60	61	62														
28	Ni			58		60	61	62	63	64	65	66														
30	Zn					64		66	67	68	69	70	71	72												
32	Ge							70		72	73	74	75	76	77	78	80									
34	Se							74		76	77	78	79	80	81	82	84									
36	Kr							78		80	81	82	83	84	85	86	88									
38	Sr							82		84	85	86	87	88	89	90	92									
40	Zr							86		88	89	90	91	92	93	94	96									
42	Mo							90		92	93	94	95	96	97	98	100									
44	Ru							94		96	97	98	99	100	101	102	104		109							
46	Pd							98		100	101	102	103	104	105	106	108		110	111	112					
48	Cd							102		104	105		108				112	113	114	115	116					
50	Sn							106		108	109		113				116	117	118	119	120	121	122		124	
52	Te							112		114	115		118				120	121	122	123	124	125	126	127	128	130
54	Xe							118		120	121		123				124	125	126	127	128	129	130	131	132	134
56	Ba							124		126	127		128				128	129	130	131	132	133	134	135	136	138
58	Ce							130		132	133						134	135	136	137	138	139	140		142	
60	Nd							136		138	139						140	141	142	143	144	145	146		148	
62	Sm							142		144	145						146	147	148	149	150	151	152		154	
64	Gd							148		150	151						152	153	154	155	156	157	158		160	
66	Dy							154		156	157						158	159	160	161	162	163	164			
68	Er							160		162	163						164	165	166	167	168		170			
70	Yb							166		168	169						170	171	172	173	174		176			
72	Hf							172		174	175						176	177	178	179	180					
74	W							178		180	181						182	183	184		186					
76	Os							184		186	187						188	189	190		192					
78	Pt							190		192	193						194	195	196		198					
80	Hg							196		198	199						200	201	202		204					
82	Pb									204	205						206	207	208							
84	Po										211							213	214							
86	Rn										217								220							
88	Ra										223								226							
90	Th										229								232							
92	U										235								238							

To find a radius, where potential energy of coulomb forces is equal to 10 MeV.

q=l=1,6*10^{-19} Cl

1 MeV=1,6*10^{-13} gl

k=9*10^{9}

Wc=10 Mev=1.6 *10^{-12} gl

1 MeV=1,6*10^{-13} gl

Z_1=2 Z_2=50|

$$Wc\,\frac{k^{*}Z_{1}^{*}Z_{1}^{*}q^{2}}{R}$$

$$R=\frac{k^{*}Z_{1}^{*}Z_{1}^{*}q^{2}}{W_{c}}=\frac{9^{*}10^{9*}2^{*}50^{*}1,6^{2*}10^{-38}}{1.6^{*}10^{-12}}=\frac{9^{*}1.6^{*}10^{11*}10^{-38}}{10^{-12}}$$ =14.5*10-^{15} m=14.5 fm

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