Introducing the Table of the Elements of Anti-Substance, and the Theoretical Grounds to It

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Herein we study how the Hyperbolic Law acts in the Periodic Table of Elements, in each of the four quadrants of the plane "molecular mass X — contents of element Y". It is shown that the symmetry of the equation $Y = K/X$ is permitted only in the 1st and 2nd quadrants. The negative numerical values on the X-axis, and also $K < 0$, testify that the 2nd quadrant should contain the elements and compounds of anti-substances.

1 Introduction

As can be seen in [1–4], our method has produced hyperbolas located in the first quadrant. At the same time, their second branches have not been investigated from the point of view of the hyperbolic law in the Periodic Table of Elements.

Its essence is reflected in the fact that in any chemical compound with molecular mass X referred to one gram-atom of a defined element K, its maintenance Y represents the equilateral hyperbola $Y = K/X$ whose top is located on the valid axis located in a corner at 45 degrees with respect to the abscissa in the positive direction.

2 Mathematical substantiation. A principle of symmetry

For any element $K > 0$ there is only one hyperbola consisting of two branches (in the first and the third quadrants). Hyperbolas with various values K cannot be imposed against each other. At each point of a hyperbola, there are coordinates according to the equation $XY = K$ where X and Y can have not only positive values, but also negative values. If we identify the set of hyperbolas at various values K, they can wholly fill the area of the rectangular corner XOY (the first quadrant). In mathematics, the two branches of an equilateral hyperbola are symmetric with respect to each other. The valid axis passes through the tops located in the first and third quadrants, and also through the center of symmetry. The normal to it is an imaginary axis, and also an axis of symmetry around which it is possible to combine both quadrants.

3 The comparative analysis of equilateral hyperbolas in the first and third quadrants

Let's consider the hyperbolas of Beryllium, Chromium, Mercury, and the last element identified by us, which we shall call 155 and which is represented in Fig. 1. Apparently, the ordinate of the curves is equal to unity, while the abscissa is 600. The tops of the curves are on the valid axis which is perpendicular to the imaginary axis, while their curvature decreases with the growth of molecular mass. These properties have been considered in detail in our previous works for the first quadrant, in which $Y = K/X$ (where $X > 0$, $Y > 0$).

If these hyperbolas are constructed in the coordinates $X < 0$, $Y < 0$, (at $K > 0$), they will take the place of the second branches and settle down in the third quadrant. Hence, the properties of these equilateral hyperbolas, proceeding from mathematical concepts, except for one, can be completely found. It is impossible to combine these curves in two quadrants as the axes X and Y have different names and, accordingly, we see that the scales are caused by chemical conditions.

This discrepancy can be excluded if we take advantage of the factor of scaling $M = 20.2895$ described in a previous work [1]. In a Fig. 2 the same hyperbolas in the coordinates transformed by means of M are shown: $X' = X/M$, $Y' = YM$. Apparently, the form and properties of the hyperbolas after transformation remain unchanged and prove the mathematical principles.

If now around an imaginary axis we make the third and the first quadrants overlap, it is possible to see that there is nearly full concurrence among the curves and valid axes (Fig. 3). However, there is some increase in the ordinates because the abscissa in Fig. 2 possesses a slightly higher value than that of the ordinate, which is easy to notice from the position of circles designating the second branches. It has no basic value since the initial scales of the coordinate axes are naturally various upon their schematic construction. Therefore, the corner of the valid axis seems to be less than 45 degrees though its equation is given by the equality $Y = X$. This fact is due to the scale of coordinate axes only. At identical values of X and Y, the tangent of the corner of an inclination of the valid axis of an equilateral hyperbola is equal to 1, while, at the same time, its top is defined as a root square of K and corresponds to the equality $X_0 = Y_0$.

It is necessary to note also that all the established laws apply extensively to adjacent hyperbolas of the kind given by $Y = 1 - KX$ [2].

4 Discussion of results

On the basis of our results, it is possible to draw a conclusion that the properties of hyperbolas described by $K = XY$, which is in first quadrant, prove to be true. The same holds for those in the third quadrant, where $K = (-X)(-Y)$. Hence,

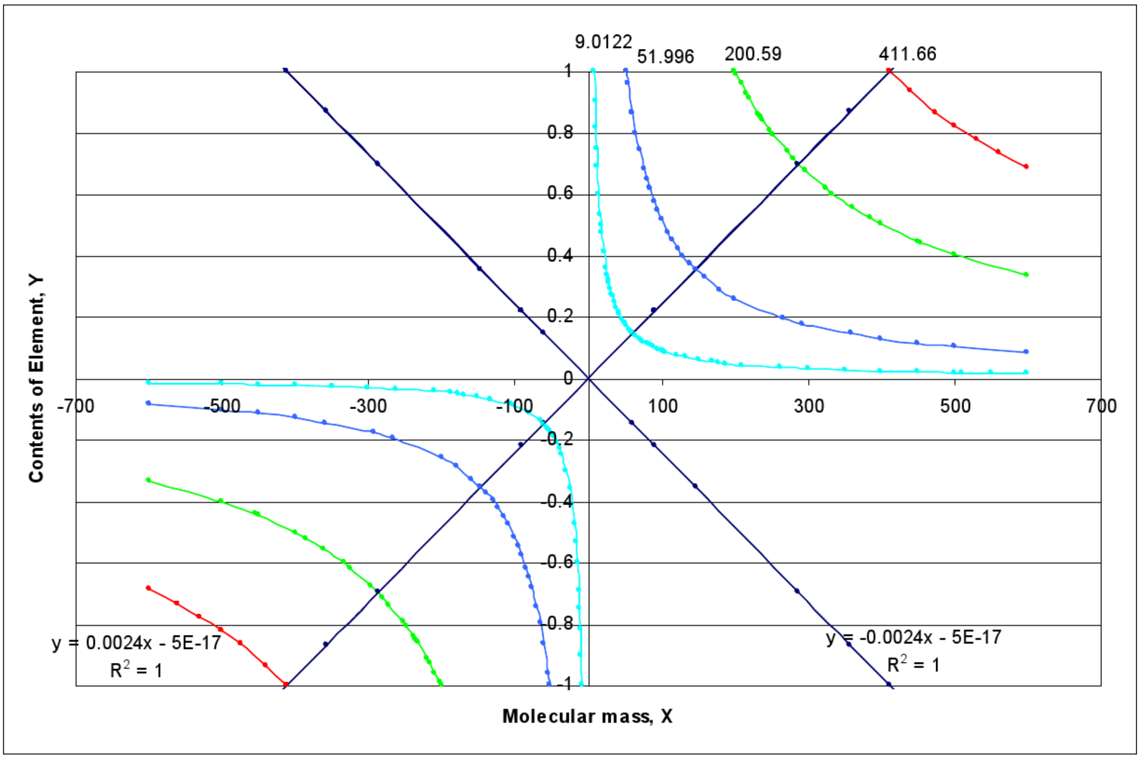

Fig. 1: Dependence of the contents of Be, Cr, Hg, No. 155 from molecular mass of the compounds.

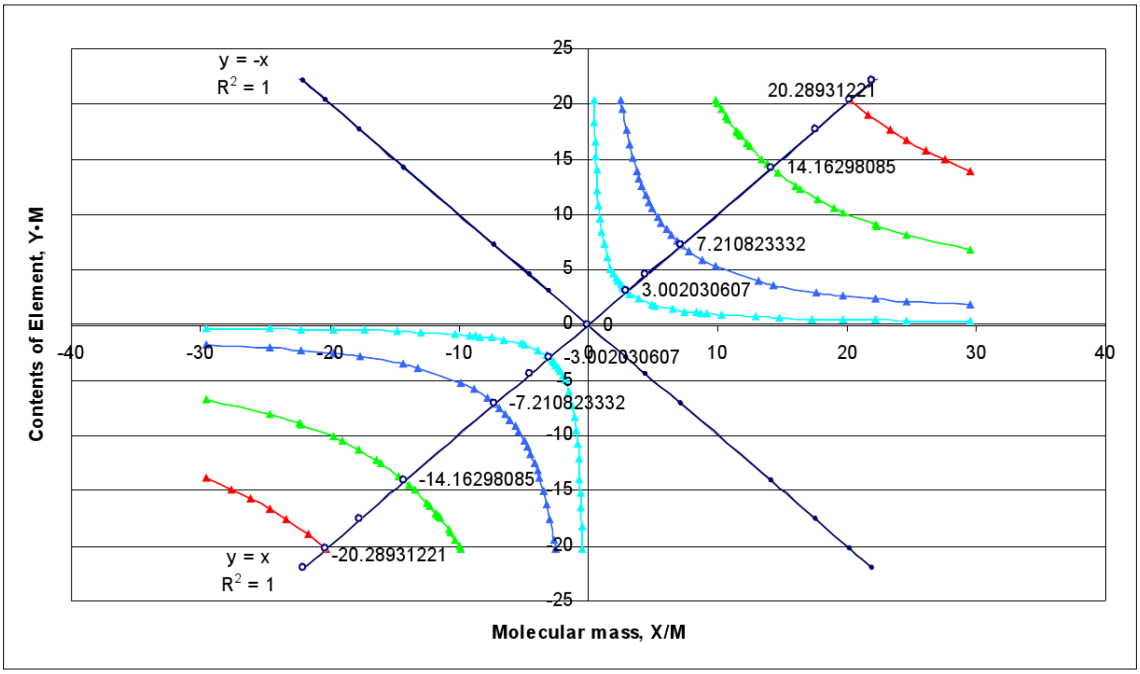

Fig. 2: Dependence of the contents of Be, Cr, Hg, No. 155 from molecular mass of the compounds, using the scaling coefficient M.

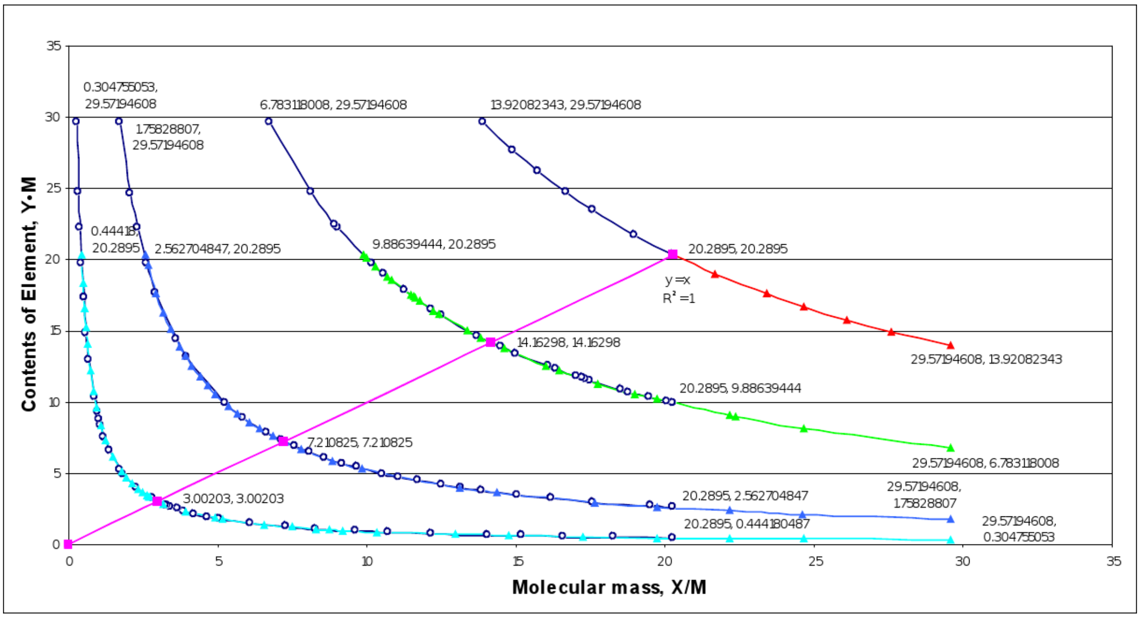

Fig. 3: The scale of the axes X and Y are numerically like each other, while the divisions of the scales are different. So, if a division is 3.075 in the axis X, while it is 1.75 in the axis Y. Under 60, the corner of the real axis gives 45°.

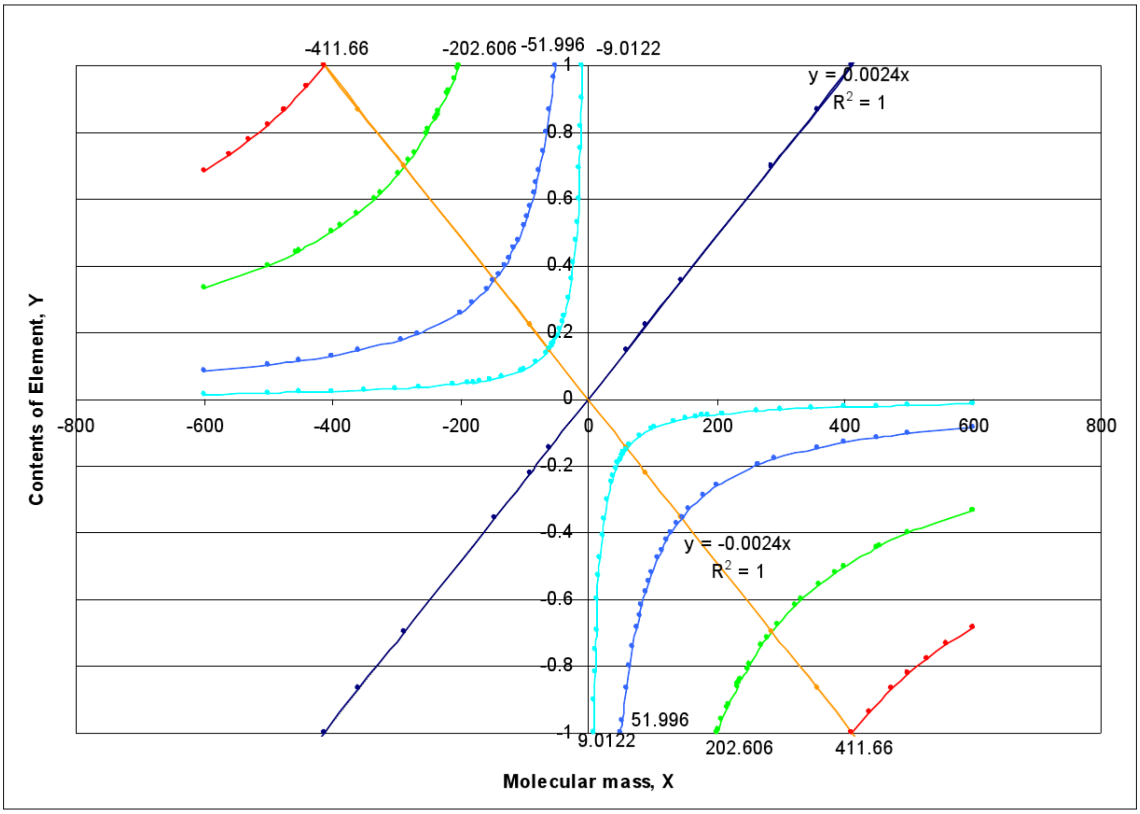

Fig. 4: Dependence of the contents of Be, Cr, Hg, No. 155 from molecular mass of the compounds in the 2nd and 4th quadrants.

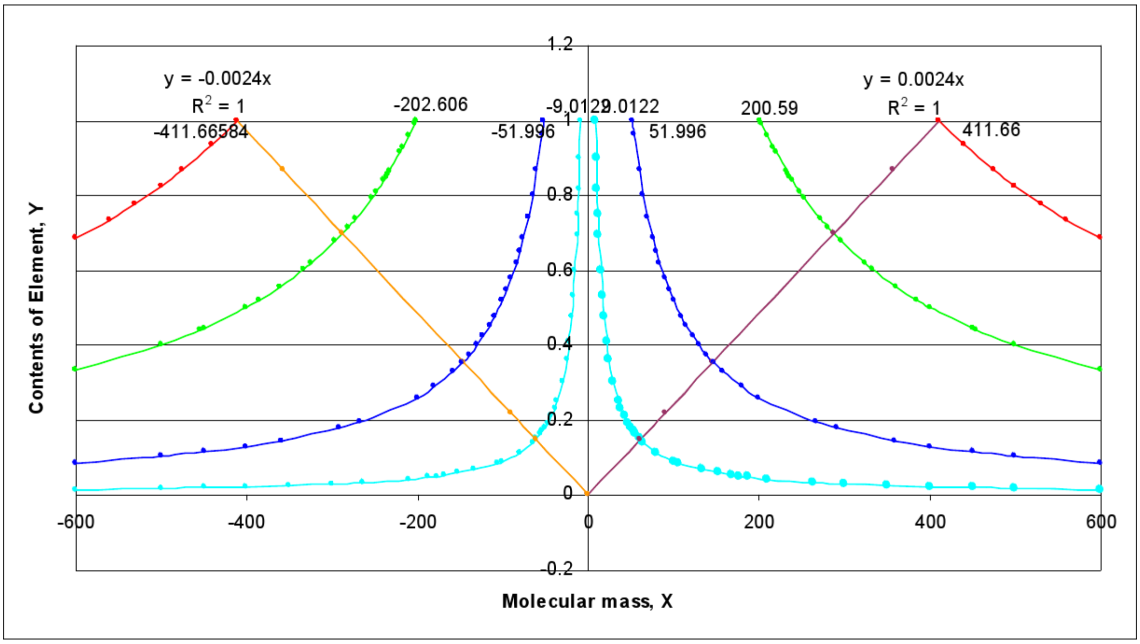

Fig. 5: Dependence of the contents of Be, Cr, Hg, No. 155 from molecular mass of the compounds in the 1st and 2nd quadrants.

1 H -	2A 2											3A 13	4A 14	5A 15	6A 16	7A 17	2 He -
3 Li -	4 Be -	3B 3	4B 4	5B 5	6B 6	7B 7	8	—8— 9	10	1B 11	2B 12	5 B -	6 C -	7 N -	8 O -	9 F -	10 Ne -
11 Na -	12 Mg -											13 Al -	14 Si -	15 P -	16 S -	17 Cl -	18 Ar -
19 K -	20 Ca -	21 Sc -	22 Ti -	23 V -	24 Cr -	25 Mn -	26 Fe -	27 Co -	28 Ni -	29 Cu -	30 Zn -	31 Ga -	32 Ge -	33 As -	34 Se -	35 Br -	36 Kr -
37 Rb -	38 Sr -	39 Y -	40 Zr -	41 Nb -	42 Mo -	43 Tc -	44 Ru -	45 Rh -	46 Pd -	47 Ag -	48 Cd -	49 In -	50 Sn -	51 Sb -	52 Te -	53 I -	54 Xe -
55 Cs -	56 Ba -	57- 71	72 Hf -	73 Ta -	74 W -	75 Re -	76 Os -	77 Ir -	78 Pt -	79 Au -	80 Hg -	81 Tl -	82 Pb -	83 Bi -	84 Po -	85 At -	86 Rn -
87 Fr -	88 Ra -	89- 103	104 Rf -	105 Db -	106 Sg -	107 Bh -	108 Hs -	109 Mt -	110 Ds -	111 Rg -	112 Uub -	113 Uut -	114 Uuq -	115 Uup -	116 Uuh -	117 Uus -	118 Uuo -

Lantanoids (upper row) and Actinoids (lower row)

57 La -	58 Ce -	59 Pr -	60 Nd -	61 Pm -	62 Sm -	63 Eu -	64 Gd -	65 Tb -	66 Dy -	67 Ho -	68 Er -	69 Tm -	70 Yb -	71 Lu -
89 Ac -	90 Th -	91 Pa -	92 U -	93 Np -	94 Pu -	95 Am -	96 Cm -	97 Bk -	98 Cf -	99 Es -	100 Fm -	101 Md -	102 No -	103 Lr -

8th period

119 -	120 -	121 -	122 -	123 -	124 -	125 -	126 -	127 -	128 -	129 -	130 -	131 -	132 -	133 -	134 -	135 -	136 -
137 -	138 -	139 -	140 -	141 -	142 -	143 -	144 -	145 -	146 -	147 -	148 -	149 -	150 -	151 -	152 -	153 -	154 -
155 -																	

s-block	alkaline metals and alkaline earth metals
d-block	transit metals
p-block	metals, metaloids and non-metals
f-block	lantanoids, actinoids
Short dash is signed in the Table for anti-elements	

Table 1: Eight periods of the Table of Substance and Anti-Substance.

the action of the Hyperbolic Law covers also an area of negative values of coordinate axes covering 155.

We recall the construction of hyperbolas at $K < 0$ (Fig. 4). Therefore, it has been established that in the second and the fourth quadrants of the hyperbolas, the same laws hold, which have also been established by us for the first and the third quadrants. It is caused by the fact that the equilateral hyperbolas have equal parameters on the module, but opposite in sign, namely, they are mutually interfaced and so possess identical properties. Therefore, proceeding from the chemical concepts, they can be symmetric only after changing the scale of the axes X, Y. Thus, referring to their congruence, unlike other mathematical conditions: curves coincide in the field of action of the factor M. Outside, its one hyperbola is generated as the abscissa increases, while the second corresponds to the increase in ordinate, not changing the direction of a curve. As it has appeared, absolute symmetry is available only on the axes X and Y.

Because in the third and fourth quadrants, a negative ordinate (a degree of transformation of a substance) cannot occur in Nature, we shall consider only quadrants 1 and 2.

From Fig. 5 it is seen that for $K > 0$ and $K < 0$ the congruence of hyperbolas and their valid axes are imposed against each other.

Corresponding to such symmetry, there is a question about the observation of chemical conditions. In the first quadrant, they have been considered in detail and do not cause doubts. In the second case (at $K < 0$) the abscissa is negative, and the ordinate is positive. Here the degree of transformation Y defined as the mass of an element (of one gram-atom), with respect to the corresponding molecular mass, is given by $Y = K/(-X)$, or, in other words, $K = (-X)Y$. From the point of view of mathematics, this result is fair. At the same time, physicists are in need of further necessary elaboration from the point of view of chemistry.

5 Substances and anti-substances

It is known that a Substance consists of atoms containing protons, neutrons, and electrons. An Anti-Substance differs only by the prefix "anti". In terms of chemical condition, all substances are divided into simple and complex (chemical compounds). They can be organic and inorganic.

As the Hyperbolic Law in the Periodic Table has been proved for hyperbolas of the first quadrant, there arises an idea to apply it also to the second quadrant. As the basis for this purpose, the quadrants are symmetric and the maintenance of elements in connection (Y) has a positive value. The difference consists only in those abscissas with opposite signs. But it is possible only when the molecular mass of a chemical compound has a minus sign. If, in the first quadrant, we arrange all possible hyperbolas around 155 inclusively, nothing prevents us from making the same apply to the second quadrant. Hence, in it there are substances with a minus sign, i.e., anti-substances constructed of anti-particles (similar to the substances in the first quadrant). With respect to mass, they are similar to a proton, neutron and, electron, only with an opposite (minus) sign.

From this it follows that it is possible to construct Table 1 (similar to the Periodic Table [3]) for the elements of anti-substances. For example, the known synthesized elements (their hyperbolas are more exact): anti-hydrogen, anti-deuterium, and anti-helium occupy symmetric places in both quadrants.

6 Conclusions

On the basis of symmetry with application of the Hyperbolic Law in the Periodic Table of Elements, the existence of anti-substances has been indirectly proved. As well, the construction of the various hyperbolas in the second quadrant and in the Table has been shown to be similar to that of the Periodic Table of Substances. It is clear that the third and fourth quadrants cannot be (directly) applied to calculation in the field of chemistry because the negative degree of transformation of substances does not exist.

Hence, it is now possible to draw a conclusion that the Hyperbolic Law established by us in the Periodic Table of Elements is generally true for the characteristics of not only substances, but also those of anti-substances. It also allows us to calculate all nuclear masses up to the last element (anti-element).

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