An Exact Investigation and Algorithm for the Descent to Obtain Potential Unswerving Span of Single Formation of Benzene Structure in the Carbon Nano Tube

S.Ranjith, K.Thiagarajan, P. Jesu Jayarin

Abstract*: *In this paper, we manipulate the graphene structure for carbon nanotube. Also mathematical algorithm and analysis on dimensions of benzene structure developed and some property also discussed. Derived some results for different levels of graphene structure along with different dimensions are discussed.

Index Terms*: *Benzene, Dimension, Equilateral Triangle, Inverted Triangle, Rectangle, Square, Nanotube.

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I. INTRODUCTION

Graphene is an allotrope of carbon in the form of a two-dimensional, atomic-scale, hexagonal lattice in which one atom forms each vertex and it has many strange properties. It is about 100 times sturdier than steel by weight, conducts heat and electricity with great efficiency and is nearly transparent. Crinkling a structure changes its form and functionality [8, 9, and 10].

For graphene, an ideal two-dimensional substance, folding can transform rather simple structures into complex shapes with new and divergent properties.

Application of Graphene include: [8, 9, and 10] Combining carbon nanotubes, bucky-balls, and polymers to produce inexpensive solar cells that can be created by simply painting a surface. Producing ultra capacitors using nanotubes that may store much more energy than batteries in hybrid cars. Using nanotube electodes in thermo cells that generate electricity from waste heat.

Carbon Nano Tubes (CNT) [8, 9, and 10] are extremely thin, unoccupied cylinders made of carbon atoms. It is a new form of carbon, configurationally equivalent to two dimensional graphene sheet rolled into a tube. It is grown now by quite a lot of system in the laboratory and is just a few nanometers in diameter and several microns long.

II. MATHEMATICAL ALGORITHM AND ANALYSIS ON DIMENSIONS OF BENZENE STRUCTURE

Let us think about a single benzene carbon configuration with all sides identical to 'A' with altitude 'H' and the wideness 'X'. In order to find the area of benzene configuration of single carbon is done by splitting the configuration into three different configurations namely,

1. Equilateral Triangle
2. Square
3. Inverted Triangle (as shown in **figure 3: b**)

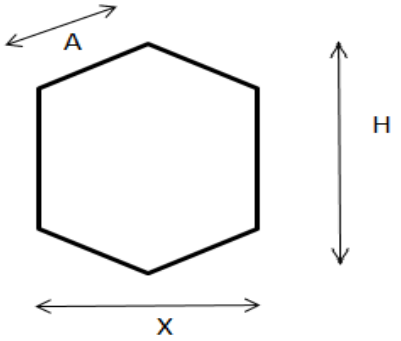

Figure 3a) Carbon benzene structure

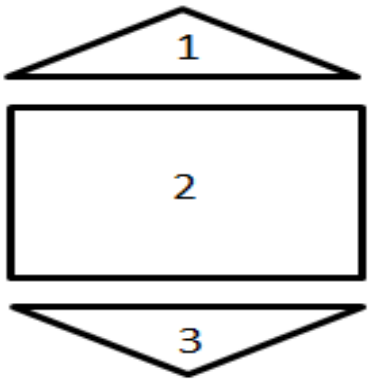

Figure 3b) Splited benzene structure

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III. ANALYSIS ON THE BENZENE CONFIGURATION

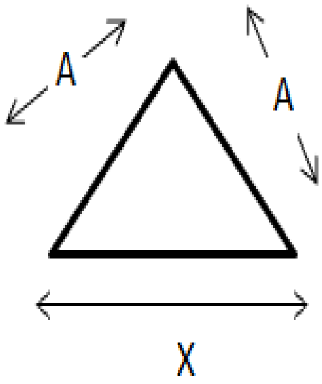

Figure 3.1a) Equilateral triangle

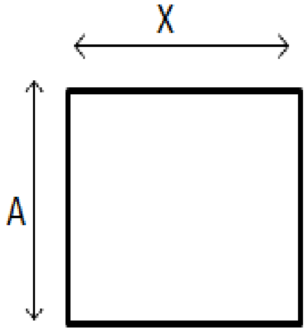

Figure 3.1b) Equilateral triangle

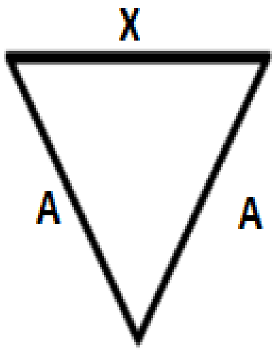

Figure 3.1c) Square

Area of the first organization (**Figure 3.1: a)** is B = XY/2 ……………………… 1.1

Area of the second construction (**Figure 3.1: b**) is C = AX ……………………… 1.2

Area of the third arrangement (**Figure 3.1: c**) is D = XY/2 ……………………… 1.3

Total area of benzene is K= X (A+Y) ..…………………...……1.4

Note: equation 1.4 derived by using the equations namely 1.1, 1.2, 1.3.

In order to calculate the length of the benzene structure of carbon is splited in right angled triangle and square as shown in figure 4.

If you are using *Word*, use either the Microsoft Equation Editor or the *MathType* add-on (http://www.mathtype.com) for equations in your paper (Insert | Object | Create New | Microsoft Equation *or* MathType Equation). "Float over text" should *not* be selected.

IV. PROPOSED ALGORITHM

Step 1: Start
Step 2: initialize **A** value
Step 3: Y = (1/2)*√3**A**^{2}
Step4: Z = **A**/2
Step 5: If the values of the Y and Z are negative discard those values
Step 6: H=2(**X**+**Z**)
Step 7: Determine the length of carbon nano tube (**X**)
Step 8: Depending on the request the number of carbons are determined

The equilateral triangle is further splited into right angle triangle to find the value of Y as shown in **figure 4**.

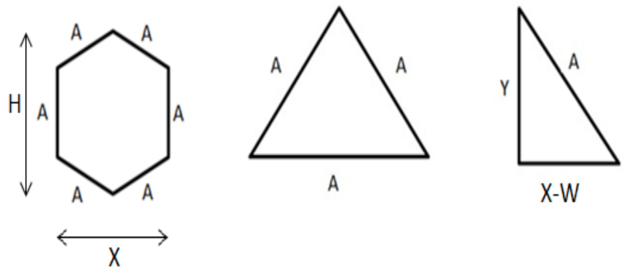

Figure 4. Single Carbon Structure is Splited into Equilateral Triangle and Further to Right Angle Triangle

The equation for finding Y as follows

$W= (X^2-A^2)/(2*X)$ ……………………… 2.1

$Y= (A^2-W^2)^{(1/2)}$ ……………………… 2.2

Where X > A, presuppose W<A, then obviously X > W > A.

Note that, the possibility of benzene structure is impossible if X <= A.

Second part is bearing in mind the square from the benzene structure and further splitting equilateral triangle and further to right angle triangle in order to find the Z.

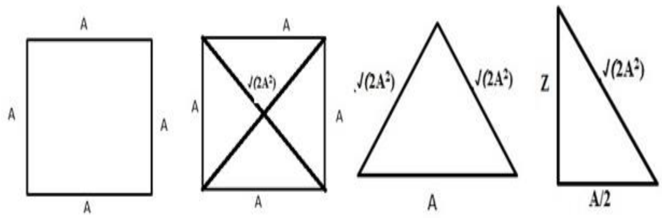

Figure 5. Single Carbon Structure to Square and Splited in Equilateral Triangle and Further to Right Angle Triangle

The following equation shows the mathematical expression for the Z as follows

Z = A/2 ………………………3

By using chain of equations 1 & 2, the height

H= 2Y+2Z ....……………………4

depending on the length of the carbon will enable to find the number of carbon to be positioned in the carbon nano tube.

If the value of **X>H** then the benzene structure exists inside the square.

In order to build the benzene structure inside one square is impossible until unless the subsequent clause satisfies.

Let us believe the sides of the square as **"X" units**, the inside benzene structure with

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side "**A**"**units ,** height **"H" units** and width **"W" units.**

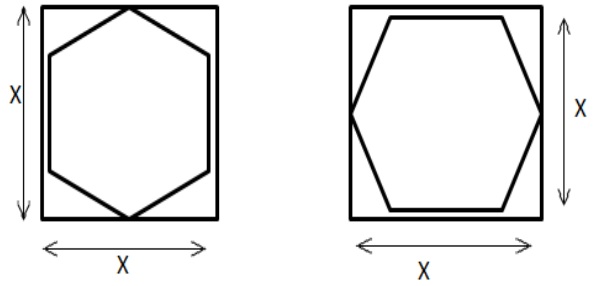

Figure 6a). Benzene Structure in Square
Figure 6 b). Benzene Structure Orientation Changed in Square

As the benzene structure can be placed in the rectangle if the length L and breath B.

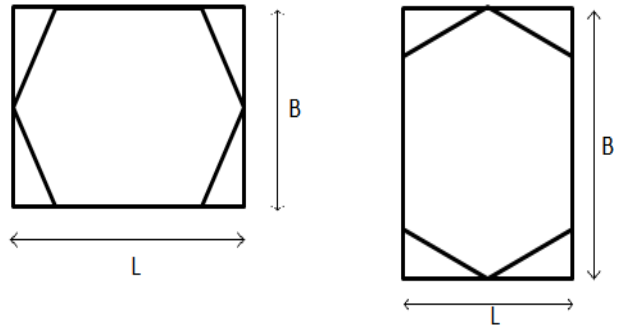

Figure 7a) Benzene Structure in Rectangle L>B
Figure 7b) Benzene Structure Orientation Changed in Rectangle L<B

Finally we found if **B = A** and **L= 2.732*A** for all values of **A** sized sides of benzene structure.

V. PROBABLE DISSIMILAR MAGNITUDE FOR MANDATORY VALUES IN DIVERSE LEVELS TO MAKE BENZENE STRUCTURED NANO TUBE CONSTRUCTION

Here A -Sides Of Benzene, H- Height Of Benzene, Z- (Sides Of Square/2), Y -Height Of Equilateral Triangle , W- If Y Is Drawn Mid Of X. X- Width Of Benzene, B- Breath Of Rectangle , L -Length Of Rectangle , K- Benzene Area, S -Square Area , R- Rectangle Area. **Also each content of table value to be multiplied by 10^{-7}.**

Sl.No	A	H	Z	Y	W	X	B	L	K	S	R
1	1	2.000088	0.5	0.500043998	0.866	1	1	2.732	1.500044	4.00035199	2.732
2	1.1	2.2000968	0.55	0.550048398	0.9526	1.1	1.1	3.0052	1.81505324	4.84042591	3.30572
3	1.2	2.4001056	0.6	0.600052798	1.0392	1.2	1.2	3.2784	2.16006336	5.76050687	3.93408
4	1.3	2.60011439	0.65	0.650057197	1.1258	1.3	1.3	3.5516	2.53507436	6.76059487	4.61708
5	1.4	2.80012319	0.7	0.700061597	1.2124	1.4	1.4	3.8248	2.94008624	7.8406899	5.35472
6	1.5	3.00013199	0.75	0.750065997	1.299	1.5	1.5	4.098	3.375099	9.00079198	6.147
7	1.6	3.20014079	0.8	0.800070397	1.3856	1.6	1.6	4.3712	3.84011264	10.2409011	6.99392
8	1.7	3.40014959	0.85	0.850074797	1.4722	1.7	1.7	4.6444	4.33512715	11.5610173	7.89548
9	1.8	3.60015839	0.9	0.900079197	1.5588	1.8	1.8	4.9176	4.86014255	12.9611405	8.85168
10	1.9	3.80016719	0.95	0.950083596	1.6454	1.9	1.9	5.1908	5.41515883	14.4412707	9.86252
11	2	4.00017599	1	1.000087996	1.732	2	2	5.464	6.00017599	16.001408	10.928
12	2.1	4.20018479	1.05	1.050092396	1.8186	2.1	2.1	5.7372	6.61519403	17.6415523	12.04812
13	2.2	4.40019359	1.1	1.100096796	1.9052	2.2	2.2	6.0104	7.26021295	19.3617036	13.22288
14	2.3	4.60020239	1.15	1.150101196	1.9918	2.3	2.3	6.2836	7.93523275	21.161862	14.45228
15	2.4	4.80021119	1.2	1.200105595	2.0784	2.4	2.4	6.5568	8.64025343	23.0420275	15.73632
16	2.5	5.00021999	1.25	1.250109995	2.165	2.5	2.5	6.83	9.37527499	25.0022	17.075
17	2.6	5.20022879	1.3	1.300114395	2.2516	2.6	2.6	7.1032	10.1402974	27.0423795	18.46832
18	2.7	5.40023759	1.35	1.350118795	2.3382	2.7	2.7	7.3764	10.9353207	29.162566	19.91628
19	2.8	5.60024639	1.4	1.400123195	2.4248	2.8	2.8	7.6496	11.7603449	31.3627596	21.41888
20	2.9	5.80025519	1.45	1.450127594	2.5114	2.9	2.9	7.9228	12.61537	33.6429603	22.97612
21	3	6.00026399	1.5	1.500131994	2.598	3	3	8.196	13.500396	36.0031679	24.588
22	3.1	6.20027279	1.55	1.550136394	2.6846	3.1	3.1	8.4692	14.4154228	38.4433826	26.25452
23	3.2	6.40028159	1.6	1.600140794	2.7712	3.2	3.2	8.7424	15.3604505	40.9636044	27.97568
24	3.3	6.60029039	1.65	1.650145194	2.8578	3.3	3.3	9.0156	16.3354791	43.5638332	29.75148
25	3.4	6.80029919	1.7	1.700149593	2.9444	3.4	3.4	9.2888	17.3405086	46.244069	31.58192
26	3.5	7.00030799	1.75	1.750153993	3.031	3.5	3.5	9.562	18.375539	49.0043119	33.467
27	3.6	7.20031679	1.8	1.800158393	3.1176	3.6	3.6	9.8352	19.4405702	51.8445618	35.40672
28	3.7	7.40032559	1.85	1.850162793	3.2042	3.7	3.7	10.1084	20.5356023	54.7648188	37.40108
29	3.8	7.60033439	1.9	1.900167193	3.2908	3.8	3.8	10.3816	21.6606353	57.7650828	39.45008
30	3.9	7.80034318	1.95	1.950171592	3.3774	3.9	3.9	10.6548	22.8156692	60.8453538	41.55372

31	4	8.00035198	2	2.000175992	3.464	4	4	10.928	24.000704	64.0056319	43.712
32	4.1	8.20036078	2.05	2.050180392	3.5506	4.1	4.1	11.2012	25.2157396	67.245917	45.92492
33	4.2	8.40036958	2.1	2.100184792	3.6372	4.2	4.2	11.4744	26.4607761	70.5662091	48.19248
34	4.3	8.60037838	2.15	2.150189192	3.7238	4.3	4.3	11.7476	27.7358135	73.9665083	50.51468
35	4.4	8.80038718	2.2	2.200193591	3.8104	4.4	4.4	12.0208	29.0408518	77.4468146	52.89152
36	4.5	9.00039598	2.25	2.250197991	3.897	4.5	4.5	12.294	30.375891	81.0071278	55.323
37	4.6	9.20040478	2.3	2.300202391	3.9836	4.6	4.6	12.5672	31.740931	84.6474482	57.80912
38	4.7	9.40041358	2.35	2.350206791	4.0702	4.7	4.7	12.8404	33.1359719	88.3677755	60.34988
39	4.8	9.60042238	2.4	2.400211191	4.1568	4.8	4.8	13.1136	34.5610137	92.1681099	62.94528
40	4.9	9.80043118	2.45	2.450215591	4.2434	4.9	4.9	13.3868	36.0160564	96.0484513	65.59532
41	5	10.00044	2.5	2.50021999	4.33	5	5	13.66	37.5011	100.0088	68.3
42	5.1	10.2004488	2.55	2.55022439	4.4166	5.1	5.1	13.9332	39.0161444	104.049155	71.05932
43	5.2	10.4004576	2.6	2.60022879	4.5032	5.2	5.2	14.2064	40.5611897	108.169518	73.87328
44	5.3	10.6004664	2.65	2.65023319	4.5898	5.3	5.3	14.4796	42.1362359	112.369887	76.74188
45	5.4	10.8004752	2.7	2.70023759	4.6764	5.4	5.4	14.7528	43.741283	116.650264	79.66512
46	5.5	11.000484	2.75	2.750241989	4.763	5.5	5.5	15.026	45.3763309	121.010648	82.643
47	5.6	11.2004928	2.8	2.800246389	4.8496	5.6	5.6	15.2992	47.0413798	125.451038	85.67552
48	5.7	11.4005016	2.85	2.850250789	4.9362	5.7	5.7	15.5724	48.7364295	129.971436	88.76268
49	5.8	11.6005104	2.9	2.900255189	5.0228	5.8	5.8	15.8456	50.4614801	134.571841	91.90448
50	5.9	11.8005192	2.95	2.950259589	5.1094	5.9	5.9	16.1188	52.2165316	139.252253	95.10092
51	6	12.000528	3	3.000263988	5.196	6	6	16.392	54.0015839	144.012672	98.352
52	6.1	12.2005368	3.05	3.050268388	5.2826	6.1	6.1	16.6652	55.8166372	148.853098	101.65772
53	6.2	12.4005456	3.1	3.100272788	5.3692	6.2	6.2	16.9384	57.6616913	153.773531	105.01808
54	6.3	12.6005544	3.15	3.150277188	5.4558	6.3	6.3	17.2116	59.5367463	158.773971	108.43308
55	6.4	12.8005632	3.2	3.200281588	5.5424	6.4	6.4	17.4848	61.4418022	163.854418	111.90272
56	6.5	13.000572	3.25	3.250285987	5.629	6.5	6.5	17.758	63.3768589	169.014872	115.427
57	6.6	13.2005808	3.3	3.300290387	5.7156	6.6	6.6	18.0312	65.3419166	174.255333	119.00592
58	6.7	13.4005896	3.35	3.350294787	5.8022	6.7	6.7	18.3044	67.3369751	179.575801	122.63948
59	6.8	13.6005984	3.4	3.400299187	5.8888	6.8	6.8	18.5776	69.3620345	184.976276	126.32768
60	6.9	13.8006072	3.45	3.450303587	5.9754	6.9	6.9	18.8508	71.4170947	190.456758	130.07052
61	7	14.000616	3.5	3.500307986	6.062	7	7	19.124	73.5021559	196.017248	133.868
62	7.1	14.2006248	3.55	3.550312386	6.1486	7.1	7.1	19.3972	75.6172179	201.657744	137.72012
63	7.2	14.4006336	3.6	3.600316786	6.2352	7.2	7.2	19.6704	77.7622809	207.378247	141.62688
64	7.3	14.6006424	3.65	3.650321186	6.3218	7.3	7.3	19.9436	79.9373447	213.178758	145.58828
65	7.4	14.8006512	3.7	3.700325586	6.4084	7.4	7.4	20.2168	82.1424093	219.059275	149.60432
66	7.5	15.00066	3.75	3.750329985	6.495	7.5	7.5	20.49	84.3774749	225.0198	153.675
67	7.6	15.2006688	3.8	3.800334385	6.5816	7.6	7.6	20.7632	86.6425413	231.060331	157.80032
68	7.7	15.4006776	3.85	3.850338785	6.6682	7.7	7.7	21.0364	88.9376086	237.18087	161.98028

Sl.No	A	H	Z	Y	W	X	B	L	K	S	R
69	7.8	15.6006864	3.9	3.900343185	6.7548	7.8	7.8	21.3096	91.2626768	243.381415	166.21488
70	7.9	15.8006952	3.95	3.950347585	6.8414	7.9	7.9	21.5828	93.6177459	249.661968	170.50412
71	8	16.000704	4	4.000351985	6.928	8	8	21.856	96.0028159	256.022528	174.848
72	8.1	16.2007128	4.05	4.050356384	7.0146	8.1	8.1	22.1292	98.4178867	262.463094	179.24652
73	8.2	16.4007216	4.1	4.100360784	7.1012	8.2	8.2	22.4024	100.862958	268.983668	183.69968
74	8.3	16.6007304	4.15	4.150365184	7.1878	8.3	8.3	22.6756	103.338031	275.584249	188.20748
75	8.4	16.8007392	4.2	4.200369584	7.2744	8.4	8.4	22.9488	105.843105	282.264837	192.76992
76	8.5	17.000748	4.25	4.250373984	7.361	8.5	8.5	23.222	108.378179	289.025431	197.387
77	8.6	17.2007568	4.3	4.300378383	7.4476	8.6	8.6	23.4952	110.943254	295.866033	202.05872
78	8.7	17.4007656	4.35	4.350382783	7.5342	8.7	8.7	23.7684	113.53833	302.786642	206.78508
79	8.8	17.6007744	4.4	4.400387183	7.6208	8.8	8.8	24.0416	116.163407	309.787258	211.56608
80	8.9	17.8007832	4.45	4.450391583	7.7074	8.9	8.9	24.3148	118.818485	316.867881	216.40172
81	9	18.000792	4.5	4.500395983	7.794	9	9	24.588	121.503564	324.028511	221.292
82	9.1	18.2008008	4.55	4.550400382	7.8806	9.1	9.1	24.8612	124.218643	331.269148	226.23692
83	9.2	18.4008096	4.6	4.600404782	7.9672	9.2	9.2	25.1344	126.963724	338.589793	231.23648
84	9.3	18.6008184	4.65	4.650409182	8.0538	9.3	9.3	25.4076	129.738805	345.990444	236.29068
85	9.4	18.8008272	4.7	4.700413582	8.1404	9.4	9.4	25.6808	132.543888	353.471102	241.39952
86	9.5	19.000836	4.75	4.750417982	8.227	9.5	9.5	25.954	135.378971	361.031767	246.563
87	9.6	19.2008448	4.8	4.800422381	8.3136	9.6	9.6	26.2272	138.244055	368.67244	251.78112
88	9.7	19.4008536	4.85	4.850426781	8.4002	9.7	9.7	26.5004	141.13914	376.393119	257.05388
89	9.8	19.6008624	4.9	4.900431181	8.4868	9.8	9.8	26.7736	144.064226	384.193805	262.38128
90	9.9	19.8008712	4.95	4.950435581	8.5734	9.9	9.9	27.0468	147.019312	392.074499	267.76332

91	**10**	**20.00088**	**5**	**5.000439981**	**8.66**	**10**	**10**	**27.32**	**150.0044**	**400.035199**	**273.2**

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