# 8.□ Geant4 Material Database

## 8.1.□ Simple Materials (Elements)

| Z | Name | density(g/cm^3) | I(eV) |
|---|---|---|---|
| 1 | G4_H | 8.3748e-05 | 19.2 |
| 2 | G4_He | 0.000166322 | 41.8 |
| 3 | G4_Li | 0.534 | 40 |
| 4 | G4_Be | 1.848 | 63.7 |
| 5 | G4_B | 2.37 | 76 |
| 6 | G4_C | 2 | 81 |
| 7 | G4_N | 0.0011652 | 82 |
| 8 | G4_O | 0.00133151 | 95 |
| 9 | G4_F | 0.00158029 | 115 |
| 10 | G4_Ne | 0.000838505 | 137 |
| 11 | G4_Na | 0.971 | 149 |
| 12 | G4_Mg | 1.74 | 156 |
| 13 | G4_Al | 2.699 | 166 |
| 14 | G4_Si | 2.33 | 173 |
| 15 | G4_P | 2.2 | 173 |
| 16 | G4_S | 2 | 180 |
| 17 | G4_Cl | 0.00299473 | 174 |
| 18 | G4_Ar | 0.00166201 | 188 |
| 19 | G4_K | 0.862 | 190 |
| 20 | G4_Ca | 1.55 | 191 |
| 21 | G4_Sc | 2.989 | 216 |
| 22 | G4_Ti | 4.54 | 233 |
| 23 | G4_V | 6.11 | 245 |
| 24 | G4_Cr | 7.18 | 257 |
| 25 | G4_Mn | 7.44 | 272 |
| 26 | G4_Fe | 7.874 | 286 |
| 27 | G4_Co | 8.9 | 297 |
| 28 | G4_Ni | 8.902 | 311 |
| 29 | G4_Cu | 8.96 | 322 |
| 30 | G4_Zn | 7.133 | 330 |
| 31 | G4_Ga | 5.904 | 334 |
| 32 | G4_Ge | 5.323 | 350 |
| 33 | G4_As | 5.73 | 347 |
| 34 | G4_Se | 4.5 | 348 |
| 35 | G4_Br | 0.0070721 | 343 |
| 36 | G4_Kr | 0.00347832 | 352 |
| 37 | G4_Rb | 1.532 | 363 |
| 38 | G4_Sr | 2.54 | 366 |
| 39 | G4_Y | 4.469 | 379 |
| 40 | G4_Zr | 6.506 | 393 |
| 41 | G4_Nb | 8.57 | 417 |
| 42 | G4_Mo | 10.22 | 424 |
| 43 | G4_Tc | 11.5 | 428 |
| 44 | G4_Ru | 12.41 | 441 |
| 45 | G4_Rh | 12.41 | 449 |
| 46 | G4_Pd | 12.02 | 470 |
| 47 | G4_Ag | 10.5 | 470 |
| 48 | G4_Cd | 8.65 | 469 |
| 49 | G4_In | 7.31 | 488 |
| 50 | G4_Sn | 7.31 | 488 |
| 51 | G4_Sb | 6.691 | 487 |
| 52 | G4_Te | 6.24 | 485 |
| 53 | G4_I | 4.93 | 491 |
| 54 | G4_Xe | 0.00548536 | 482 |
| 55 | G4_Cs | 1.873 | 488 |
| 56 | G4_Ba | 3.5 | 491 |
| 57 | G4_La | 6.154 | 501 |
| 58 | G4_Ce | 6.657 | 523 |
| 59 | G4_Pr | 6.71 | 535 |
| 60 | G4_Nd | 6.9 | 546 |
| 61 | G4_Pm | 7.22 | 560 |
| 62 | G4_Sm | 7.46 | 574 |
| 63 | G4_Eu | 5.243 | 580 |
| 64 | G4_Gd | 7.9004 | 591 |

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65  G4_Tb          8.229        614
66  G4_Dy           8.55        628
67  G4_Ho          8.795        650
68  G4_Er          9.066        658
69  G4_Tm          9.321        674
70  G4_Yb           6.73        684
71  G4_Lu           9.84        694
72  G4_Hf          13.31        705
73  G4_Ta         16.654        718
74   G4_W           19.3        727
75  G4_Re          21.02        736
76  G4_Os          22.57        746
77  G4_Ir          22.42        757
78  G4_Pt          21.45        790
79  G4_Au          19.32        790
80  G4_Hg         13.546        800
81  G4_Tl          11.72        810
82  G4_Pb          11.35        823
83  G4_Bi          9.747        823
84  G4_Po           9.32        830
85  G4_At           9.32        825
86  G4_Rn    0.00900662        794
87  G4_Fr              1        827
88  G4_Ra              5        826
89  G4_Ac          10.07        841
90  G4_Th          11.72        847
91  G4_Pa          15.37        878
92   G4_U          18.95        890
93  G4_Np          20.25        902
94  G4_Pu          19.84        921
95  G4_Am          13.67        934
96  G4_Cm          13.51        939
97  G4_Bk             14        952
98  G4_Cf             10        966
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## 8.2.\uf0a0 NIST Compounds

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============================================================
 Ncomp             Name      density(g/cm^3)  I(eV) ChFormula
============================================================
 6            G4_A-150_TISSUE      1.127      65.1
         1      0.101327
         6        0.7755
         7      0.035057
         8     0.0523159
         9      0.017422
        20      0.018378
 3                G4_ACETONE     0.7899      64.2
         6             3
         1             6
         8             1
 2              G4_ACETYLENE  0.0010967      58.2
         6             2
         1             2
 3                G4_ADENINE        1.6      71.4
         6             5
         1             5
         7             5
 7     G4_ADIPOSE_TISSUE_ICRP       0.95      63.2
         1         0.114
         6         0.598
         7         0.007
         8         0.278
        11         0.001
        16         0.001
        17         0.001
 4                    G4_AIR 0.00120479      85.7
         6      0.000124
         7      0.755268
         8      0.231781
        18      0.012827
 4                G4_ALANINE       1.42      71.9
         6             3
         1             7
         7             1
         8             2
 2           G4_ALUMINUM_OXIDE       3.97     145.2   Al_2O_3
        13             2
```

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         8             3
 3                G4_AMBER        1.1      63.2
         1       0.10593
         6      0.788974
         8      0.105096
 2               G4_AMMONIA 0.000826019      53.7
         7             1
         1             3
 3               G4_ANILINE     1.0235      66.2
         6             6
         1             7
         7             1
 2              G4_ANTHRACENE      1.283      69.5
         6            14
         1            10
 6              G4_B-100_BONE       1.45      85.9
         1     0.0654709
         6      0.536944
         7        0.0215
         8      0.032085
         9      0.167411
        20      0.176589
 3                G4_BAKELITE       1.25      72.4
         1      0.057441
         6      0.774591
         8      0.167968
 2          G4_BARIUM_FLUORIDE       4.89     375.9
        56             1
         9             2
 3           G4_BARIUM_SULFATE        4.5     285.7
        56             1
        16             1
         8             4
 2               G4_BENZENE    0.87865      63.4
         6             6
         1             6
 2          G4_BERYLLIUM_OXIDE       3.01      93.2
         4             1
         8             1
 3                   G4_BGO       7.13     534.1
        83             4
        32             3
         8            12
10              G4_BLOOD_ICRP       1.06      75.2
         1         0.102
         6          0.11
         7         0.033
         8         0.745
        11         0.001
        15         0.001
        16         0.002
        17         0.003
        19         0.002
        26         0.001
 8        G4_BONE_COMPACT_ICRU       1.85      91.9
         1         0.064
         6         0.278
         7         0.027
         8          0.41
        12         0.002
        15          0.07
        16         0.002
        20         0.147
 9       G4_BONE_CORTICAL_ICRP       1.92       110
         1         0.034
         6         0.155
         7         0.042
         8         0.435
        11         0.001
        12         0.002
        15         0.103
        16         0.003
        20         0.225
 2            G4_BORON_CARBIDE       2.52      84.7
         5             4
         6             1
 2              G4_BORON_OXIDE      1.812      99.6
         5             2
         8             3
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9              G4_BRAIN_ICRP       1.04      73.3
        1          0.107
        6          0.145
        7          0.022
        8          0.712
       11          0.002
       15          0.004
       16          0.002
       17          0.003
       19          0.003
2                G4_BUTANE 0.00249343      48.3
        6              4
        1             10
3         G4_N-BUTYL_ALCOHOL     0.8098      59.9
        6              4
        1             10
        8              1
5                 G4_C-552       1.76      86.8
        1        0.02468
        6       0.501611
        8       0.004527
        9       0.465209
       14       0.003973
2        G4_CADMIUM_TELLURIDE        6.2     539.3
       48              1
       52              1
3        G4_CADMIUM_TUNGSTATE        7.9     468.3
       48              1
       74              1
        8              4
3        G4_CALCIUM_CARBONATE        2.8     136.4
       20              1
        6              1
        8              3
2         G4_CALCIUM_FLUORIDE       3.18       166
       20              1
        9              2
2            G4_CALCIUM_OXIDE        3.3     176.1
       20              1
        8              1
3         G4_CALCIUM_SULFATE       2.96     152.3
       20              1
       16              1
        8              4
3        G4_CALCIUM_TUNGSTATE      6.062       395
       20              1
       74              1
        8              4
2           G4_CARBON_DIOXIDE 0.00184212        85   CO_2
        6              1
        8              2
2    G4_CARBON_TETRACHLORIDE      1.594     166.3
        6              1
       17              4
3    G4_CELLULOSE_CELLOPHANE       1.42      77.6
        6              6
        1             10
        8              5
3      G4_CELLULOSE_BUTYRATE        1.2      74.6
        1       0.067125
        6       0.545403
        8       0.387472
4        G4_CELLULOSE_NITRATE       1.49        87
        1       0.029216
        6       0.271296
        7       0.121276
        8       0.578212
5            G4_CERIC_SULFATE       1.03      76.7
        1       0.107596
        7         0.0008
        8       0.874976
       16       0.014627
       58       0.002001
2          G4_CESIUM_FLUORIDE      4.115     440.7
       55              1
        9              1
2            G4_CESIUM_IODIDE       4.51     553.1
       55              1
       53              1
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 3           G4_CHLOROBENZENE     1.1058      89.1
         6                6
         1                5
        17                1
 3              G4_CHLOROFORM     1.4832       156
         6                1
         1                1
        17                3
10                G4_CONCRETE        2.3     135.2
         1             0.01
         6            0.001
         8         0.529107
        11            0.016
        12            0.002
        13         0.033872
        14         0.337021
        19            0.013
        20            0.044
        26            0.014
 2              G4_CYCLOHEXANE      0.779      56.4
         6                6
         1               12
 3     G4_1,2-DICHLOROBENZENE     1.3048     106.5
         6                6
         1                4
        17                2
 4   G4_DICHLORODIETHYL_ETHER     1.2199     103.3
         6                4
         1                8
         8                1
        17                2
 3      G4_1,2-DICHLOROETHANE     1.2351     111.9
         6                2
         1                4
        17                2
 3           G4_DIETHYL_ETHER    0.71378        60
         6                4
         1               10
         8                1
 4  G4_N,N-DIMETHYL_FORMAMIDE     0.9487      66.6
         6                3
         1                7
         7                1
         8                1
 4      G4_DIMETHYL_SULFOXIDE     1.1014      98.6
         6                2
         1                6
         8                1
        16                1
 2                 G4_ETHANE 0.00125324      45.4
         6                2
         1                6
 3           G4_ETHYL_ALCOHOL     0.7893      62.9
         6                2
         1                6
         8                1
 3         G4_ETHYL_CELLULOSE       1.13      69.3
         1         0.090027
         6         0.585182
         8         0.324791
 2               G4_ETHYLENE 0.00117497      50.7
         6                2
         1                4
 8           G4_EYE_LENS_ICRP       1.07      73.3
         1            0.096
         6            0.195
         7            0.057
         8            0.646
        11            0.001
        15            0.001
        16            0.003
        17            0.001
 2            G4_FERRIC_OXIDE        5.2     227.3
        26                2
         8                3
 2             G4_FERROBORIDE       7.15       261
        26                1
         5                1
 2           G4_FERROUS_OXIDE        5.7     248.6
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       26             1
        8             1
7         G4_FERROUS_SULFATE      1.024      76.4
        1      0.108259
        7       2.7e-05
        8      0.878636
       11       2.2e-05
       16      0.012968
       17       3.4e-05
       26       5.4e-05
3               G4_FREON-12       1.12       143
        6      0.099335
        9      0.314247
       17      0.586418
3              G4_FREON-12B2        1.8     284.9
        6      0.057245
        9      0.181096
       35      0.761659
3               G4_FREON-13       0.95     126.6
        6      0.114983
        9      0.545621
       17      0.339396
3              G4_FREON-13B1        1.5     210.5
        6             1
        9             3
       35             1
3              G4_FREON-13I1        1.8     293.5
        6      0.061309
        9      0.290924
       53      0.647767
3   G4_GADOLINIUM_OXYSULFIDE       7.44     493.3
       64             2
        8             2
       16             1
2        G4_GALLIUM_ARSENIDE       5.31     384.9
       31             1
       33             1
5      G4_GEL_PHOTO_EMULSION     1.2914      74.8
        1       0.08118
        6       0.41606
        7       0.11124
        8       0.38064
       16       0.01088
6             G4_Pyrex_Glass       2.23       134
        5     0.0400639
        8      0.539561
       11     0.0281909
       13      0.011644
       14      0.377219
       19    0.00332099
5              G4_GLASS_LEAD       6.22     526.4
        8      0.156453
       14      0.080866
       22      0.008092
       33      0.002651
       82      0.751938
4             G4_GLASS_PLATE        2.4     145.4
        8        0.4598
       11     0.0964411
       14      0.336553
       20      0.107205
4               G4_GLUTAMINE       1.46      73.3
        6             5
        1            10
        7             2
        8             3
3              G4_GLYCEROL     1.2613      72.6
        6             3
        1             8
        8             3
4                G4_GUANINE        2.2        75
        6             5
        1             5
        7             5
        8             1
4                 G4_GYPSUM       2.32     129.7
       20             1
       16             1
        8             6
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```
        1             4
2               G4_N-HEPTANE    0.68376      54.4
        6             7
        1            16
2                G4_N-HEXANE     0.6603         54
        6             6
        1            14
4                  G4_KAPTON       1.42      79.6
        6            22
        1            10
        7             2
        8             5
3    G4_LANTHANUM_OXYBROMIDE       6.28     439.7
       57             1
       35             1
        8             1
3    G4_LANTHANUM_OXYSULFIDE       5.86     421.2
       57             2
        8             2
       16             1
2              G4_LEAD_OXIDE       9.53     766.7
        8      0.071682
       82      0.928318
3           G4_LITHIUM_AMIDE      1.178      55.5
        3             1
        7             1
        1             2
3        G4_LITHIUM_CARBONATE       2.11      87.9
        3             2
        6             1
        8             3
2         G4_LITHIUM_FLUORIDE      2.635        94
        3             1
        9             1
2           G4_LITHIUM_HYDRIDE       0.82      36.5
        3             1
        1             1
2            G4_LITHIUM_IODIDE      3.494     485.1
        3             1
       53             1
2             G4_LITHIUM_OXIDE      2.013      73.6
        3             2
        8             1
3     G4_LITHIUM_TETRABORATE       2.44      94.6
        3             2
        5             4
        8             7
9               G4_LUNG_ICRP       1.04      75.3
        1         0.105
        6         0.083
        7         0.023
        8         0.779
       11         0.002
       15         0.001
       16         0.002
       17         0.003
       19         0.002
5                  G4_M3_WAX       1.05      67.9
        1      0.114318
        6      0.655824
        8     0.0921831
       12      0.134792
       20      0.002883
3     G4_MAGNESIUM_CARBONATE      2.958        118
       12             1
        6             1
        8             3
2      G4_MAGNESIUM_FLUORIDE          3     134.3
       12             1
        9             2
2           G4_MAGNESIUM_OXIDE       3.58     143.8
       12             1
        8             1
3   G4_MAGNESIUM_TETRABORATE       2.53     108.3
       12             1
        5             4
        8             7
2           G4_MERCURIC_IODIDE       6.36     684.5
       80             1
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       53             2
2                G4_METHANE 0.000667151      41.7
        6             1
        1             4
3                G4_METHANOL     0.7914      67.6
        6             1
        1             4
        8             1
5               G4_MIX_D_WAX       0.99      60.9
        1       0.13404
        6       0.77796
        8       0.03502
       12      0.038594
       22      0.014386
6             G4_MS20_TISSUE          1      75.1
        1      0.081192
        6      0.583442
        7      0.017798
        8      0.186381
       12      0.130287
       17        0.0009
9    G4_MUSCLE_SKELETAL_ICRP       1.05      75.3
        1         0.102
        6         0.143
        7         0.034
        8          0.71
       11         0.001
       15         0.002
       16         0.003
       17         0.001
       19         0.004
8    G4_MUSCLE_STRIATED_ICRU       1.04      74.7
        1      0.102102
        6      0.123123
        7      0.035035
        8       0.72973
       11      0.001001
       15      0.002002
       16      0.004004
       19      0.003003
4     G4_MUSCLE_WITH_SUCROSE       1.11      74.3
        1     0.0982341
        6      0.156214
        7      0.035451
        8      0.710101
4  G4_MUSCLE_WITHOUT_SUCROSE       1.07      74.2
        1      0.101969
        6      0.120058
        7      0.035451
        8      0.742522
2             G4_NAPHTHALENE      1.145      68.4
        6            10
        1             8
4            G4_NITROBENZENE    1.19867      75.8
        6             6
        1             5
        7             1
        8             2
2           G4_NITROUS_OXIDE 0.00183094      84.9
        7             2
        8             1
4              G4_NYLON-8062       1.08      64.3
        1      0.103509
        6      0.648416
        7     0.0995361
        8      0.148539
4               G4_NYLON-6-6       1.14      63.9
        6             6
        1            11
        7             1
        8             1
4              G4_NYLON-6-10       1.14      63.2
        1      0.107062
        6      0.680449
        7      0.099189
        8        0.1133
4         G4_NYLON-11_RILSAN      1.425      61.6
        1      0.115476
        6      0.720818
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         7     0.0764169
         8     0.0872889
2                 G4_OCTANE     0.7026      54.7
         6             8
         1            18
2               G4_PARAFFIN       0.93      55.9
         6            25
         1            52
2              G4_N-PENTANE     0.6262      53.6
         6             5
         1            12
8          G4_PHOTO_EMULSION      3.815       331
         1        0.0141
         6      0.072261
         7       0.01932
         8      0.066101
        16       0.00189
        35      0.349103
        47      0.474105
        53       0.00312
2 G4_PLASTIC_SC_VINYLTOLUENE      1.032      64.7
         6             9
         1            10
2       G4_PLUTONIUM_DIOXIDE      11.46     746.5
        94             1
         8             2
3       G4_POLYACRYLONITRILE       1.17      69.6
         6             3
         1             3
         7             1
3           G4_POLYCARBONATE        1.2      73.1
         6            16
         1            14
         8             3
3       G4_POLYCHLOROSTYRENE        1.3      81.7
         6             8
         1             7
        17             1
2            G4_POLYETHYLENE       0.94      57.4   (C_2H_4)_N-Polyethylene
         6             1
         1             2
3                  G4_MYLAR        1.4      78.7
         6            10
         1             8
         8             4
3              G4_PLEXIGLASS       1.19        74
         6             5
         1             8
         8             2
3        G4_POLYOXYMETHYLENE      1.425      77.4
         6             1
         1             2
         8             1
2           G4_POLYPROPYLENE        0.9      56.5   (C_2H_4)_N-Polypropylene
         6             2
         1             4
2             G4_POLYSTYRENE       1.06      68.7
         6             8
         1             8
2                 G4_TEFLON        2.2      99.1
         6             2
         9             4
3 G4_POLYTRIFLUOROCHLOROETHYLENE        2.1     120.7
         6             2
         9             3
        17             1
3       G4_POLYVINYL_ACETATE       1.19      73.7
         6             4
         1             6
         8             2
3       G4_POLYVINYL_ALCOHOL        1.3      69.7
         6             2
         1             4
         8             1
3       G4_POLYVINYL_BUTYRAL       1.12      67.2
         6             8
         1            14
         8             2
3      G4_POLYVINYL_CHLORIDE        1.3     108.2
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```
         6             2
         1             3
        17             1
3 G4_POLYVINYLIDENE_CHLORIDE        1.7     134.3
         6             2
         1             2
        17             2
3 G4_POLYVINYLIDENE_FLUORIDE       1.76      88.8
         6             2
         1             2
         9             2
4   G4_POLYVINYL_PYRROLIDONE       1.25      67.7
         6             6
         1             9
         7             1
         8             1
2        G4_POTASSIUM_IODIDE       3.13     431.9
        19             1
        53             1
2          G4_POTASSIUM_OXIDE       2.32     189.9
        19             2
         8             1
2                 G4_PROPANE 0.00187939      47.1
         6             3
         1             8
2               G4_lPROPANE       0.43        52
         6             3
         1             8
3        G4_N-PROPYL_ALCOHOL     0.8035      61.1
         6             3
         1             8
         8             1
3                G4_PYRIDINE     0.9819      66.2
         6             5
         1             5
         7             1
2             G4_RUBBER_BUTYL       0.92      56.5
         1      0.143711
         6      0.856289
2           G4_RUBBER_NATURAL       0.92      59.8
         1      0.118371
         6      0.881629
3          G4_RUBBER_NEOPRENE       1.23        93
         1       0.05692
         6      0.542646
        17      0.400434
2          G4_SILICON_DIOXIDE       2.32     139.2   SiO_2
        14             1
         8             2
2           G4_SILVER_BROMIDE      6.473     486.6
        47             1
        35             1
2          G4_SILVER_CHLORIDE       5.56     398.4
        47             1
        17             1
3           G4_SILVER_HALIDES       6.47     487.1
        35      0.422895
        47      0.573748
        53      0.003357
2            G4_SILVER_IODIDE       6.01     543.5
        47             1
        53             1
9                 G4_SKIN_ICRP       1.09      72.7
         1          0.1
         6        0.204
         7        0.042
         8        0.645
        11        0.002
        15        0.001
        16        0.002
        17        0.003
        19        0.001
3          G4_SODIUM_CARBONATE      2.532       125
        11             2
         6             1
         8             3
2            G4_SODIUM_IODIDE      3.667       452
        11             1
        53             1
```

```
2         G4_SODIUM_MONOXIDE       2.27     148.8
       11              2
        8              1
3          G4_SODIUM_NITRATE      2.261     114.6
       11              1
        7              1
        8              3
2                G4_STILBENE     0.9707      67.7
        6             14
        1             12
3                 G4_SUCROSE     1.5805      77.5
        6             12
        1             22
        8             11
2                G4_TERPHENYL       1.24      71.7
        6             18
        1             14
9              G4_TESTIS_ICRP       1.04        75
        1          0.106
        6          0.099
        7           0.02
        8          0.766
       11          0.002
       15          0.001
       16          0.002
       17          0.002
       19          0.002
2     G4_TETRACHLOROETHYLENE      1.625     159.2
        6              2
       17              4
2       G4_THALLIUM_CHLORIDE      7.004     690.3
       81              1
       17              1
9        G4_TISSUE_SOFT_ICRP       1.03      72.3
        1          0.105
        6          0.256
        7          0.027
        8          0.602
       11          0.001
       15          0.002
       16          0.003
       17          0.002
       19          0.002
4      G4_TISSUE_SOFT_ICRU-4          1      74.9
        1          0.101
        6          0.111
        7          0.026
        8          0.762
4          G4_TISSUE-METHANE 0.00106409      61.2
        1       0.101869
        6       0.456179
        7       0.035172
        8        0.40678
4          G4_TISSUE-PROPANE 0.00182628      59.5
        1       0.102672
        6        0.56894
        7       0.035022
        8       0.293366
2        G4_TITANIUM_DIOXIDE       4.26     179.5
       22              1
        8              2
2                 G4_TOLUENE     0.8669      62.5
        6              7
        1              8
3       G4_TRICHLOROETHYLENE       1.46     148.1
        6              2
        1              1
       17              3
4      G4_TRIETHYL_PHOSPHATE       1.07      81.2
        6              6
        1             15
        8              4
       15              1
2   G4_TUNGSTEN_HEXAFLUORIDE        2.4     354.4
       74              1
        9              6
2       G4_URANIUM_DICARBIDE      11.28       752
       92              1
        6              2
```

```
 2     G4_URANIUM_MONOCARBIDE       13.63        862
        92              1
         6              1
 2          G4_URANIUM_OXIDE       10.96      720.6
        92              1
         8              2
 4                    G4_UREA       1.323       72.8
         6              1
         1              4
         7              2
         8              1
 4                   G4_VALINE        1.23       67.7
         6              5
         1             11
         7              1
         8              2
 3                    G4_VITON         1.8       98.6
         1       0.009417
         6       0.280555
         9       0.710028
 2                    G4_WATER           1         78   H_2O
         1              2
         8              1
 2              G4_WATER_VAPOR 0.000756182       71.6   H_2O-Gas
         1              2
         8              1
 2                   G4_XYLENE        0.87       61.8
         6              8
         1             10
 1                 G4_GRAPHITE        2.21         78   Graphite
```

## 8.3.￼ HEP and Nuclear Materials

```
============================================================
 Ncomp              Name      density(g/cm^3)  I(eV) ChFormula
============================================================
 1                    G4_lH2     0.0708       21.8
 1                    G4_lN2      0.807         82
 1                    G4_lO2      1.141         95
 1                    G4_lAr      1.396        188
 1                    G4_lBr     3.1028        343
 1                    G4_lKr      2.418        352
 1                    G4_lXe      2.953        482
 3                   G4_PbWO4       8.28          0
         8              4
        82              1
        74              1
 1                 G4_Galactic      1e-25       21.8
 1           G4_GRAPHITE_POROUS        1.7         78   Graphite
 3                   G4_LUCITE       1.19         74
         1       0.080538
         6       0.599848
         8       0.319614
 3                    G4_BRASS       8.52          0
        29             62
        30             35
        82              3
 3                   G4_BRONZE       8.82          0
        29             89
        30              9
        82              2
 3           G4_STAINLESS-STEEL          8          0
        26             74
        24             18
        28              8
 3                    G4_CR39       1.32          0
         1             18
         6             12
         8              7
 3                G4_OCTADECANOL      0.812          0
         1             38
         6             18
         8              1
```

## 8.4.￼ Space (ISS) Materials

```
============================================================
```

```
 Ncomp              Name      density(g/cm^3)  I(eV) ChFormula
============================================================
 4                  G4_KEVLAR        1.44          0
         6            14
         1            10
         8             2
         7             2
 3                  G4_DACRON         1.4          0
         6            10
         1             8
         8             4
 3                 G4_NEOPRENE       1.23          0
         6             4
         1             5
        17             1
```

## 8.5.￼ Bio-Chemical Materials

```
============================================================
 Ncomp              Name      density(g/cm^3)  I(eV) ChFormula
============================================================
 4                 G4_CYTOSINE       1.55         72
         1             5
         6             4
         7             3
         8             1
 4                  G4_THYMINE       1.23         72
         1             6
         6             5
         7             2
         8             2
 4                   G4_URACIL       1.32         72
         1             4
         6             4
         7             2
         8             2
 3              G4_DNA_ADENINE          1         72
         1             4
         6             5
         7             5
 4              G4_DNA_GUANINE          1         72
         1             4
         6             5
         7             5
         8             1
 4             G4_DNA_CYTOSINE          1         72
         1             4
         6             4
         7             3
         8             1
 4              G4_DNA_THYMINE          1         72
         1             5
         6             5
         7             2
         8             2
 4                G4_DNA_URACIL          1         72
         1             3
         6             4
         7             2
         8             2
 4             G4_DNA_ADENOSINE          1         72
         1            10
         6            10
         7             5
         8             4
 4             G4_DNA_GUANOSINE          1         72
         1            10
         6            10
         7             5
         8             5
 4              G4_DNA_CYTIDINE          1         72
         1            10
         6             9
         7             3
         8             5
 4              G4_DNA_URIDINE          1         72
         1             9
         6             9
```

```
         7              2
         8              6
4       G4_DNA_METHYLURIDINE          1        72
         1             11
         6             10
         7              2
         8              6
2       G4_DNA_MONOPHOSPHATE          1        72
        15              1
         8              3
5                   G4_DNA_A          1        72
         1             10
         6             10
         7              5
         8              7
        15              1
5                   G4_DNA_G          1        72
         1             10
         6             10
         7              5
         8              8
        15              1
5                   G4_DNA_C          1        72
         1             10
         6              9
         7              3
         8              8
        15              1
5                   G4_DNA_U          1        72
         1              9
         6              9
         7              2
         8              9
        15              1
5                  G4_DNA_MU          1        72
         1             11
         6             10
         7              2
         8              9
        15              1
```