

**ISÓTOPOS NO RADIATIVOS**

| ELEMENTO | Z     | A     | %      | (A x %)/100 | MASA MEDIA CALCULADA | ESTRUCTURA ÁTOMO NEUTRO |    |    | MASA MEDIA REAL (*) |
|----------|-------|-------|--------|-------------|----------------------|-------------------------|----|----|---------------------|
|          |       |       |        |             |                      | p+                      | n  | e- |                     |
| H        | 1     | 1     | 99,99  | 1,000       | 1,00                 | 1                       | 0  | 1  | 1,01                |
|          |       | 2     | 0,01   | 0,000       |                      |                         | 1  |    |                     |
| He       | 2     | 3     | 0,01   | 0,000       | 4,00                 | 2                       | 1  | 2  | 4                   |
|          |       | 4     | 99,99  | 4,000       |                      |                         | 2  |    |                     |
| Li       | 3     | 6     | 7,59   | 0,455       | 6,92                 | 3                       | 3  | 3  | 6,94                |
|          |       | 7     | 92,41  | 6,469       |                      |                         | 4  |    |                     |
| Be       | 4     | 9     | 100    | 9,000       | 9,00                 | 4                       | 5  | 4  | 9,01                |
| B        | 5     | 10    | 19,9   | 1,990       | 10,80                | 5                       | 5  | 5  | 10,81               |
|          |       | 11    | 80,1   | 8,811       |                      |                         | 6  |    |                     |
| C        | 6     | 12    | 98,93  | 11,872      | 12,01                | 6                       | 6  | 6  | 12,01               |
|          |       | 13    | 1,07   | 0,139       |                      |                         | 7  |    |                     |
| N        | 7     | 14    | 99,63  | 13,948      | 14,00                | 7                       | 7  | 7  | 14,01               |
|          |       | 15    | 0,37   | 0,056       |                      |                         | 8  |    |                     |
| O        | 8     | 16    | 99,757 | 15,961      | 16,00                | 8                       | 8  | 8  | 15,99               |
|          |       | 17    | 0,038  | 0,006       |                      |                         | 9  |    |                     |
|          |       | 18    | 0,205  | 0,037       |                      |                         | 10 |    |                     |
| F        | 9     | 19    | 100    | 19,000      | 19,00                | 9                       | 10 | 9  | 18,99               |
| Ne       | 10    | 20    | 90,48  | 18,096      | 20,19                | 10                      | 10 | 10 | 20,18               |
|          |       | 21    | 0,27   | 0,057       |                      |                         | 11 |    |                     |
|          |       | 22    | 9,25   | 2,035       |                      |                         | 12 |    |                     |
| Na       | 11    | 23    | 100    | 23,000      | 23,00                | 11                      | 12 | 11 | 22,99               |
| Mg       | 12    | 24    | 78,99  | 18,958      | 24,32                | 12                      | 12 | 12 | 24,31               |
|          |       | 25    | 10     | 2,500       |                      |                         | 13 |    |                     |
|          |       | 26    | 11,01  | 2,863       |                      |                         | 14 |    |                     |
| Al       | 13    | 27    | 100    | 27,000      | 27,00                | 13                      | 14 | 13 | 26,98               |
| Si       | 14    | 28    | 92,23  | 25,824      | 28,11                | 14                      | 14 | 14 | 28,09               |
|          |       | 29    | 4,68   | 1,357       |                      |                         | 15 |    |                     |
|          |       | 30    | 3,09   | 0,927       |                      |                         | 16 |    |                     |
| P        | 15    | 31    | 100    | 31,000      | 31,00                | 15                      | 16 | 15 | 30,97               |
| S        | 16    | 32    | 94,93  | 30,378      | 32,09                | 16                      | 16 | 16 | 32,07               |
|          |       | 33    | 0,76   | 0,251       |                      |                         | 17 |    |                     |
|          |       | 34    | 4,29   | 1,459       |                      |                         | 18 |    |                     |
|          |       | 36    | 0,02   | 0,007       |                      |                         | 20 |    |                     |
| Cl       | 17    | 35    | 75,78  | 26,523      | 35,48                | 17                      | 18 | 17 | 35,45               |
|          |       | 37    | 24,22  | 8,961       |                      |                         | 20 |    |                     |
| Ar       | 18    | 36    | 0,34   | 0,122       | 39,99                | 18                      | 18 | 18 | 39,95               |
|          |       | 38    | 0,06   | 0,023       |                      |                         | 20 |    |                     |
|          |       | 40    | 99,6   | 39,840      |                      |                         | 22 |    |                     |
| K        | 19    | 39    | 93,26  | 36,371      | 39,13                | 19                      | 20 | 19 | 39,09               |
|          |       | 40    | 0,01   | 0,004       |                      |                         | 21 |    |                     |
|          |       | 41    | 6,73   | 2,759       |                      |                         | 22 |    |                     |
| Ca       | 20    | 40    | 96,941 | 38,776      | 40,12                | 20                      | 20 | 20 | 40,08               |
|          |       | 42    | 0,647  | 0,272       |                      |                         | 22 |    |                     |
|          |       | 43    | 0,135  | 0,058       |                      |                         | 23 |    |                     |
|          |       | 44    | 2,086  | 0,918       |                      |                         | 24 |    |                     |
|          |       | 46    | 0,004  | 0,002       |                      |                         | 26 |    |                     |
| 48       | 0,187 | 0,090 | 28     |             |                      |                         |    |    |                     |
| Sc       | 21    | 45    | 100    | 45,000      | 45,00                | 21                      | 24 | 21 | 44,96               |
| Ti       | 22    | 46    | 8,25   | 3,795       | 47,92                | 22                      | 24 | 22 | 47,87               |
|          |       | 47    | 7,44   | 3,497       |                      |                         | 25 |    |                     |
|          |       | 48    | 73,72  | 35,386      |                      |                         | 26 |    |                     |
|          |       | 49    | 5,41   | 2,651       |                      |                         | 27 |    |                     |
|          |       | 50    | 5,18   | 2,590       |                      |                         | 28 |    |                     |

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|          |    |    |       |             |                      | p+                      | n  | e- |                     |
| V        | 23 | 50 | 0,25  | 0,125       | 51,00                | 23                      | 27 | 23 | 50,94               |
|          |    | 51 | 99,75 | 50,873      |                      |                         | 28 |    |                     |
| Cr       | 24 | 50 | 4,35  | 2,175       | 52,06                | 24                      | 26 | 24 | 51,99               |
|          |    | 52 | 83,79 | 43,571      |                      |                         | 28 |    |                     |
|          |    | 53 | 9,5   | 5,035       |                      |                         | 29 |    |                     |
|          |    | 54 | 2,37  | 1,280       |                      |                         | 30 |    |                     |
| Mn       | 25 | 55 | 100   | 55,000      | 55,00                | 25                      | 30 | 25 | 54,94               |
| Fe       | 26 | 54 | 5,85  | 3,159       | 55,91                | 26                      | 28 | 26 | 55,85               |
|          |    | 56 | 91,75 | 51,380      |                      |                         | 30 |    |                     |
|          |    | 57 | 2,12  | 1,208       |                      |                         | 31 |    |                     |
|          |    | 58 | 0,28  | 0,162       |                      |                         | 32 |    |                     |
| Co       | 27 | 59 | 100   | 59,000      | 59,00                | 27                      | 32 | 27 | 58,93               |
| Ni       | 28 | 58 | 68,08 | 39,486      | 58,76                | 28                      | 30 | 28 | 58,69               |
|          |    | 60 | 26,22 | 15,732      |                      |                         | 32 |    |                     |
|          |    | 61 | 1,14  | 0,695       |                      |                         | 33 |    |                     |
|          |    | 62 | 3,63  | 2,251       |                      |                         | 34 |    |                     |
|          |    | 64 | 0,93  | 0,595       |                      |                         | 36 |    |                     |
| Cu       | 29 | 63 | 69,17 | 43,577      | 63,62                | 29                      | 34 | 29 | 63,55               |
|          |    | 65 | 30,83 | 20,040      |                      |                         | 36 |    |                     |
| Zn       | 30 | 64 | 48,63 | 31,123      | 65,47                | 30                      | 34 | 30 | 65,41               |
|          |    | 66 | 27,9  | 18,414      |                      |                         | 36 |    |                     |
|          |    | 67 | 4,1   | 2,747       |                      |                         | 37 |    |                     |
|          |    | 68 | 18,75 | 12,750      |                      |                         | 38 |    |                     |
|          |    | 70 | 0,62  | 0,434       |                      |                         | 40 |    |                     |
| Ga       | 31 | 69 | 60,11 | 41,476      | 69,80                | 31                      | 38 | 31 | 69,72               |
|          |    | 71 | 39,89 | 28,322      |                      |                         | 40 |    |                     |
| Ge       | 32 | 70 | 20,84 | 14,588      | 72,69                | 32                      | 38 | 32 | 72,64               |
|          |    | 72 | 27,54 | 19,829      |                      |                         | 40 |    |                     |
|          |    | 73 | 7,73  | 5,643       |                      |                         | 41 |    |                     |
|          |    | 74 | 36,28 | 26,847      |                      |                         | 42 |    |                     |
|          |    | 76 | 7,61  | 5,784       |                      |                         | 44 |    |                     |
| As       | 33 | 75 | 100   | 75,000      | 75,00                | 33                      | 42 | 33 | 74,92               |
| Se       | 34 | 74 | 0,89  | 0,659       | 79,04                | 34                      | 40 | 34 | 78,96               |
|          |    | 76 | 9,37  | 7,121       |                      |                         | 42 |    |                     |
|          |    | 77 | 7,63  | 5,875       |                      |                         | 43 |    |                     |
|          |    | 78 | 23,77 | 18,541      |                      |                         | 44 |    |                     |
|          |    | 80 | 49,61 | 39,688      |                      |                         | 46 |    |                     |
|          |    | 82 | 8,73  | 7,159       |                      |                         | 48 |    |                     |
| Br       | 35 | 79 | 50,69 | 40,045      | 79,99                | 35                      | 44 | 35 | 79,9                |
|          |    | 81 | 49,31 | 39,941      |                      |                         | 46 |    |                     |
| Kr       | 36 | 78 | 0,35  | 0,273       | 83,89                | 36                      | 42 | 36 | 83,79               |
|          |    | 80 | 2,28  | 1,824       |                      |                         | 44 |    |                     |
|          |    | 82 | 11,58 | 9,496       |                      |                         | 46 |    |                     |
|          |    | 83 | 11,49 | 9,537       |                      |                         | 47 |    |                     |
|          |    | 84 | 57    | 47,880      |                      |                         | 48 |    |                     |
|          |    | 86 | 17,3  | 14,878      |                      |                         | 50 |    |                     |