Isotopic Abundances and Atomic Weights of the Elements

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A large number of measurements describing the isotopic composition of the elements using a variety of analytical methods have been reported since the discovery of the first isotope in 1912. During the past several decades, however, mass spectrometric methods have been used, almost exclusively, to determine the isotopic composition, and thus the atomic weights, of the elements. This evaluated compilation reports the literature references for all complete mass spectrometric measurements published during the period 1920 through 1983. Also given are the isotopic compositions, the isotope ratios, the atomic weights calculated from the data, the appropriate nuclidic masses and an evaluation of the errors of the measurements. For each polynuclidic element, a best measurement has been selected.

Key words: atomic weights; chemical elements; elements; isotopes; isotopic composition; isotope ratios; mass spectrometry.

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1. Introduction

The first discovery of a stable "isotope" of an element, ^{22}Ne, by J.J. Thomson in November 1912 started an era of more refined knowledge of the nature of the elements. This period continued until the report of the discovery of ^{180}Ta by White, Collins and Rourke in 1955, the most recently reported new isotope. Tantalum had been previously believed to be mononuclidic with ^{181}Ta the only stable nuclide.

A variety of measurements describing the terrestrial isotopic composition of the elements has been published, both in the open and in more restricted literature since Thomson's discovery. However, it soon became apparent that the reported measurements frequently did not agree. In some cases, real variations in the natural isotopic composition were reported and have subsequently been verified. In other cases, unjustified high accuracy was claimed, which led to the conclusion that real isotopic variations existed. More recent work has shown that these conclusions were frequently erroneous and that no significant variations in the natural isotopic composition exist in many cases, at least at current measurement precision.

Since there is now a wide scientific interest in isotopic composition and natural isotopic measurements, the authors thought it useful to identify and assemble isotopic abundance literature for all the elements. Much of this literature is not readily available from libraries or in journals, either because it was published only as internal reports of various types, or the data were released from previously classified documents years after the measurements were performed.

This document is an outgrowth of three preliminary unpublished reports prepared in 1963 and 1964 at the Central Bureau of Nuclear Measurements (Joint Research Centre of the Commission of the European Communities), Geel, Belgium. The data presented here were compiled from literature sources there, and from literature files at the General Electric Knolls Atomic Power Laboratory, Schenectady, New York; the Brookhaven National Laboratory, Upton, New York; and the National Bureau of Standards, Gaithersburg, Maryland.

The present evaluated compilation is intended to provide all published data, along with the appropriate literature references, on isotopic abundances which have been reported in the open and available literature. It is limited to data obtained by mass spectrometric methods since, in general, these methods provide measurements of higher precision and accuracy than any other methods available at this time. The literature covered was published from 1940 to the end of 1983. References to literature published prior to 1940 have, in some cases, been included but, primarily due to instrumental limitations existent in the period 1923—1940 much of that work was considered of lesser value for the purposes of this compilation. In general, literature has only been included for those cases where complete isotopic abundances (or alternatively, all isotopic ratios) have been reported. Much of the available literature in which only variations of individual isotopic ratios have been reported, has been omitted. In most of these cases, variations reported versus some reference material or ratio are not complete and make the calculation of abundances or of meaningful atomic weight values difficult if not impossible.

2. Explanation of the Tables

The elements are listed in the tables in order of increasing atomic number and using the names of the elements, in English, as recommended by the International Union of Pure and Applied Chemistry. For each element, in the line below the name and number of the element is listed the atomic weight (A_r(E)) recommended by the International Commission on Atomic Weights (now called the IUPAC Commission on Atomic Weights and Isotopic Abundances) in 1961 when these values were recalculated from the oxygen to the carbon scale. If the recommended value or the uncertainty (U_r(E)) has changed in the period 1961 to 1983, the changed value and the year of the recommended change are also listed. The references to each of the complete Reports of the Commission during that time are given at the end of this compilation.

In the tables, the appropriate nuclidic masses (in unified atomic mass units, u) for each stable isotope are listed (A.H. Wapstra and K. Bos, Atomic Data and Nuclear Data Tables, **19**, 175 (1977).) The uncertainties for these are not repeated here since, in general, the nuclidic masses are known to a precision much greater than than that of the corresponding isotopic abundance and, except for the mononuclidic elements, the uncertainty on the nuclidic mass is of lesser importance. The reader is cautioned however, that the levels of precision reached in the past few years in the determination of isotopic abundance values have approached the point where the nuclidic mass uncertainties may no longer be neglected and the most recent nuclidic mass evaluation should be consulted.

The references to the published data are given in chronological order for each element. The isotopic abundances and isotopic ratios are given for each reference. The data are given as presented in the original literature (however, see below). The user should be aware that, in some cases, the isotopic abundances given do not total to 100 percent. Where other information was not given so that corrections could be made (e.g. where isotopic ratios were not published) the data have not been corrected but are given as published. Uncertainties assigned by the original authors to the data are given in brackets and are applicable to the last digits. Where no uncertainties are indicated, none was given in the original literature and those authors are assumed to have intended an error of ± 1 on the last digit given (see discussion below.)

The authors of this compilation initially decided it would be of use to the majority of readers if both the isotopic composition (isotope abundances in atom percent) and the isotope ratios were presented. Further it was decided that, for the purpose of comparison, it would be useful if the ratios were given with a common base isotope for each element. It should be noted that data were presented in a variety of ways in the original literature. In some cases only abundances were given, in others the isotopic ratios were given but different reference isotopes were used from paper to paper. The necessary calculations have been made to present here both isotopic abundances and isotopic ratios using a common reference isotope. The choice of the base or common isotope was, in many cases, arbitrary although some general guidelines were used. For example, for systems of two isotopes only, the heavier isotope was frequently chosen as the denominator. For systems of more than two isotopes, a moderately abundant (a few percent) isotope near the center of mass for the element was chosen, however, in many cases, there have been other reasons that the majority of authors of data have chosen a common isotope to report the data and we have accepted that choice. To calculate the atomic weight for each entry, it was most convenient to use a computer program developed by one of the authors (ILB) which requires as input the isotopic abundance and the error on the abundance, thus it was necessary to calculate the abundances and the associated errors on the abundances in each case where that was not given in the literature. A small "c" annotating the uncertainty on an abundance indicates that we have calculated that uncertainty from that given for an isotopic ratio in the literature.

Next the atomic weight and its uncertainty are given as calculated from the abundances and the nuclidic masses. In the cases mentioned above, where isotopic abundances do not total to 100 percent, the atomic weight given has been normalized using the simple factor of the difference between the totals given and 100 percent. The indicated uncertainities for the mononuclidic elements were obtained by multiplying the uncertainties given by Wapstra and Bos for the appropriate nuclide by a factor of six. We believe that this gives an uncertainty as consistent as possible with those given for the polynuclidic elements.

An indication of the type of uncertainty quoted in the original literature is given below the atomic weight value as follows:

"NS" is used to indicate that an error value was not stated in the original literature.

"SD", "2XSD", and "3XSD" indicates that the author stated the errors to be 1, 2, or 3 standard deviations.

"P" indicates probable error (as defined by the author).

"SE" indicates standard error.

In the final row of the table a "C" has been placed if the measurement is known to be one which is calibrated with the use of separated isotopes thus becoming an "absolute" measurement. In a few cases the "C" has been appended where the effects of measurement fractionation have been removed by the use of the "double spike" technique, and where this was judged to have been done with particular care in the preparation and calibration of the spike solutions. A "B" has been added to the measurement which has been judged to be the best measurement from a natural source. The designation of "best measurement" was generally done on the basis of a calibrated measurement or a double spiked measurement. If

neither were available for an element, the most precise measurement was chosen from the group of published literature which gave sufficient detail of the measurement process for the authors to judge that reasonable care had been taken to eliminate the more common sources of error. As a result, the reader should note that the best measurement is not necessarily a good one.

Finally, in the last column (Ref. 83ICA1) the isotopic abundances are given as recommended by the IUPAC Subcommittee on the Assessment of Isotopic Composition of the Commission on Atomic Weights and Isotopic Abundances as "representative" for the element. In some cases, where it is known that the isotopic abundances for an element do not vary in nature and a calibrated measurement is available, the representative composition is the same as the best measurement. In other cases, the representative compositions are given with less precision, either because no calibrated measurements are available, or the possibility of small changes in isotopic composition exists. In general, however, these may be taken as the composition which might be expected in an average bottle of reagent chemicals. Nevertheless, the user should be aware that materials are available in commerce where the isotopic composition may vary considerably from these values (this is particularly true of the elements B, Li, and U). If more accurate values are needed, the reader is urged to obtain and use specially analyzed samples. The reader is referred to a recent publication by Peiser et al. for additional information on representative isotopic compositions and the effects of these on atomic weights (H.S. Peiser, I.L. Barnes, P.J. De Bièvre, J.R. De Laeter, R. Hagemann, N.E. Holden, T.J. Murphy, E. Roth, M. Shima, and H.G. Thode, "Element by Element Review of their Atomic Weights", Pure Appl. Chem. **56**, 696 (1984).

The last section of this publication contains the complete reference to the data. The reference system used was originally developed by one of the authors (NEH) for the General Electric Wall Chart of the Nuclides and is based on using the last two digits of the year of publication, followed by the first three letters of the first author's last (family) name and is followed by a single digit serial number.

The authors hope that this evaluated compilation will be of help to the scientist interested in the isotopic abundance of the elements and will help save the tedious effort of searching the literature, particularly since many of the original citations are no longer readily available. Additional information from those references may be obtained from the authors.

As mentioned above, this compilation was developed over a number of years. Every effort has been made to make it as complete as possible but it is inevitable that the authors have, inadvertently, missed some important references. We would be most grateful if readers would draw these to our attention. We would also appreciate receiving copies of reprints of papers that might be included in a future update of this compilation.

3. Acknowledgments

Many helpful discussions with the author's colleagues on the Commission on Atomic Weights and Isotopic Abundances and, especially, those who served on the Subcommission for Isotopic Abundances have added to the completeness of this compilation and their assistance and encouragement is gratefully acknowledged. Much appreciation is due to H.S. Peiser, T.J. Murphy, N.N. Greenwood, and E.R. Cohen whose careful reading of the manuscript and thoughtful suggestions have helped to make it more readable and useful. We owe a special debt of gratitude to the late A.E. "Gus" Cameron who was always ready to help and who offered freely from his vast knowledge of the field. We also thank Ann Lawrence, Teresa Sperow, Gelene Hensley, and Joy Shoemaker whose skills and patience in the preparation of the manuscript made it possible.

Element $_1$H Hydrogen

1961 1.00797 1969 1.0080 (3) 1971 1.0079 1981 1.00794 (7)

Mass no.	Nuclidic mass	36HAL1	38MOR1	38VOS1
1	1.007825037	99.9844 (5)[c]	99.9839 (5)[c]	99.98508 (1)[c]
2	2.014101787	0.0156 (5)[c]	0.0161 (5)[c]	0.01492 (11)[c]
Isotope ratio 2/1		0.0001563 (42)	0.0001613 (52)	0.00014922
Atomic weight		1.007982 (5)	1.007987 (5)	1.0079752 (1)
Error		NS	NS	NS
Annotation				

Mass no.	Nuclidic mass	39SWA1	51KIR1	51KIR1	54CLA1
1	1.007825037	99.9855	99.9861 (1)	99.9847 (1)	99.9848 (3)
2	2.014101787	0.0145	0.0139 (1)	0.0153 (1)	0.0152 (3)
Isotope ratio 2/1		0.0001449	0.00013902	0.00015302	0.0001520
Atomic weight		1.007971 (1)	1.007965 (1)	1.007979 (1)	1.007978 (3)
Error		NS	SD	SD	SD
Annotation					

Mass no.	Nuclidic mass	60HOR1	60HOR1	70HAG1	83ICA1
1	1.007825037	99.98511 (5)	99.98531 (5)	99.984426 (5)[c]	99.985 (1)
2	2.014101787	0.01489 (5)	0.01469 (5)	0.015574 (5)[c]	0.015 (1) (for water only)
Isotope ratio 2/1		0.00014892	0.00014692	0.00015576 (5)	0.000150
Atomic weight		1.0079749 (5)	1.0079729 (5)	1.00798176 (5)	1.00798 (1)
Error		P	P	2XSD	
Annotation				C, B	

Element $_2$He Helium

1961 4.0026 1969 4.00260 1983 4.002602 (2)

Mass no.	Nuclidic mass	34VAU1	46ALD1	46ALD1	47FAI1
3	3.016029297	0.00286	0.000016 (4)[c]	0.00013 (13)[c]	0.00012
4	4.00260325	99.997	99.999984 (4)[c]	99.99987 (13)[c]	99.99988
Isotope ratio 3/4		2.9×10^{-5}	1.6×10^{-6} (4)	1.3×10^{-6} (3)	1.2×10^{-6}
Atomic weight		4.0025694 (1)	4.00260310 (4)	4.0026020 (3)	4.0026021 (1)
Error		NS	SD	SD	NS
Annotation					

Element $_2$He Helium--continued

Mass no.	Nuclidic mass	47FAI1	48ALD1	70MAM1	76CLA1
3	3.016029297	0.00013	0.000120 (12)[c]	0.0001399 (13)	0.0001384 (6)
4	4.00260325	99.99987	99.999880 (12)[c]	99.9998601 (13)	99.9998616 (6)
Isotope ratio 3/4		1.3×10^{-6}	1.2×10^{-6} (2)	1.399×10^{-6} (13)	1.384×10^{-6} (6)
Atomic weight		4.0026020 (1)	4.0026021 (1)	4.00260188 (1)	4.002601895 (6)
Error		NS	SD	SD	SD
Annotation					B

Mass no.	Nuclidic mass	84ICA1
3	3.016029297	0.000138 (3)
4	4.00260325	99.999862 (3) (for air only)
Isotope ratio 3/4		1.380×10^{-6}
Atomic weight		4.00260190 (3)
Error		
Annotation		

Element $_3$Li Lithium

1961 6.939 1969 6.941 (3) 1983 6.941 (2)

Mass no.	Nuclidic mass	32AST1	47ING3	48ING4	48WHI1
6	6.0151232	8.33	7.386 (22)[c]	7.407 (33)[c]	7.299 (37)[c]
7	7.0160045	91.67	92.614 (22)[c]	92.593 (33)[c]	92.701 (37)[c]
Isotope ratio 7/6		11	12.54 (4)	12.50 (6)	12.7 (7)
Atomic weight		6.9326 (1)	6.9421 (2)	6.9419 (3)	6.9429 (4)
Error		NS	NS	NS	SD
Annotation					

Mass no.	Nuclidic mass	56ORD1	56ORD1	56PAC1	56WHI1
6	6.0151232	7.413 (11)[c]	7.418 (11)[c]	7.519 (57)	8.12
7	7.0160045	92.587 (11)[c]	92.582 (11)[c]	92.481 (57)	91.88
Isotope ratio 7/6		12.49 (2)	12.48 (2)	12.3 (1)	11.32
Atomic weight		6.9418 (1)	6.9418 (1)	6.9407 (6)	6.9347 (1)
Error		NS	NS	NS	NS
Annotation					

Element $_3$Li Lithium--continued

Mass no.	Nuclidic mass	58OMU1	58PAL1	58PAL1	60OMU1
6	6.0151232	7.418 (28)[c]	7.4239 (55)[c]	7.479 (28)[c]	7.418 (22)[c]
7	7.0160045	92.582 (28)[c]	92.5761 (55)[c]	92.521 (28)[c]	92.582 (22)[c]
Isotope ratio 7/6		12.48 (5)	12.47 (1)	12.37 (5)	12.48 (5)
Atomic weight		6.9418 (3)	6.94180 (5)	6.9411 (3)	6.9418 (2)
Error		NS	NS	3XSD	NS
Annotation					

Mass No.	Nuclidic mass	60OMU1	60OMU1	60PAL1	62PUP1
6	6.0151232	7.605 (10)[c]	7.629 (10)[c]	7.4239 (55)	7.490 (17)[c]
7	7.0160045	92.395 (10)[c]	92.371 (10)[c]	92.5761 (55)	92.510 (17)[c]
Isotope ratio 7/6		12.15 (1)	12.108 (10)	12.47	12.35 (3)
Atomic weight		6.9399 (1)	6.9396 (1)	6.94170 (5)	6.9410 (2)
Error		NS	NS	3XSD	SE
Annotation					

Mass no.	Nuclidic mass	62TAN2	62TAN2	62TAN2	63SHI4
6	6.0151232	7.474 (10)[c]	7.474 (17)[c]	7.468 (10)[c]	7.69 (12)[c]
7	7.0160045	92.526 (10)[c]	92.526 (17)[c]	92.532 (10)[c]	92.31 (12)[c]
Isotope ratio 7/6		12.38 (1)	12.38 (3)	12.39 (1)	12.0 (2)
Atomic weight		6.9412 (1)	6.9412 (2)	6.9413 (1)	6.939 (1)
Error		SE	SE	SE	SD
Annotation					

Mass no.	Nuclidic mass	64KRA1	65SVE1	66SHI2	66SHI2
6	6.0151232	7.587 (46)[c]	7.563 (28)[c]	7.63 (10)[c]	7.46 (17)[c]
7	7.0160045	92.413 (46)[c]	92.437 (28)[c]	92.37 (10)[c]	92.54 (17)[c]
Isotope ratio 7/6		12.18 (6)	12.22 (5)	12.1 (1)	12.4 (3)
Atomic weight		6.9401 (5)	6.9403 (3)	6.940 (1)	6.941 (2)
Error		3XSD	SD	SD	SD
Annotation			C		

Element $_3$Li Lithium--continued

Mass no.	Nuclidic mass	73FLE1	77BRO1	83MIC1	84ICA1
6	6.0151232	7.68 (2)[c]	7.602 (37)	7.525 (29)	7.5 (2)
7	7.0160045	92.32 (2)[c]	92.398 (37)	92.475 (29)	92.5 (2)
Isotope ratio 7/6		12.02 (3)	12.15	12.29 (5)	12.3
Atomic weight		6.9391 (2)	6.9399 (4)	6.9407 (3)	6.941 (2)
Error		SD	2XSD	2XSD	
Annotation		C		C, B	

Element $_4$Be Beryllium

1961 9.0122 1969 9.01218

Mass no.	Nuclidic mass	37NIE2	63LEI1	84ICA1
9	9.0121825	100	100	100
Isotope ratio		–	–	–
Atomic weight		9.012182 (2)	9.012182 (2)	9.012182 (2)
Error		NS	NS	
Annotation			B	

Element $_5$B Boron

1961 10.811 (3) 1969 10.81 1983 10.811 (5)

Mass no.	Nuclidic mass	46ING1	48THO1	48THO1	500SB1
10	10.0129380	18.83 (2)	18.98	18.45	19.57
11	11.0093053	81.17 (2)	81.02	81.55	80.43
Isotope ratio 11/10		4.31	4.27	4.42	4.11
Atomic weight		10.8217 (2)	10.8202 (1)	10.8255 (1)	10.8143 (1)
Error		NS	NS	NS	NS
Annotation					

Mass no.	Nuclidic Mass	56SHI1	56SHI1	58BEN1	58PAL1
10	10.0129380	19.61	19.05	19.3 (1)	19.65
11	11.0093053	80.39	80.95	80.7 (1)	80.35
Isotope ratio 11/10		4.10	4.25	4.18	4.09
Atomic weight		10.8139 (1)	10.8195 (1)	10.817 (1)	10.8135 (1)
Error		NS	NS	NS	NS
Annotation					

Element $_5$B Boron--continued

Mass no.	Nuclidic Mass	60BEN1	61FIN1	61FIN1	61GOR1
10	10.0129380	19.27 (13)	19.92	19.72	19.83
11	11.0093053	80.73 (13)	80.08	80.28	80.17
Isotope ratio 11/10		4.09	4.019	4.070	4.044
Atomic weight		10.817 (1)	10.8108 (1)	10.8128 (1)	10.8117 (1)
Error		3XSD	SD	SD	2XSD
Annotation					

Mass no.	Nuclidic mass	61GOR1	61GOR1	61MCM1	61MCM1
10	10.0129380	19.93	20.00	19.84	19.84
11	11.0093053	80.07	80.00	80.16	80.16
Isotope ratio 11/10		4.017	4.000	4.040	4.040
Atomic weight		10.8107 (1)	10.8100 (1)	10.8116 (1)	10.8116 (1)
Error		2XSD	2XSD	NS	NS
Annotation					

Mass no.	Nuclidic mass	61MCM1	61MCM1	63SHI3	63BIE1
10	10.0129380	19.73	19.72	19.80	19.82 (3)
11	11.0093053	80.27	80.28	80.20	80.18 (3)
Isotope ratio 11/10		4.068	4.072	4.05	4.045
Atomic weight		10.8127 (1)	10.8128 (1)	10.8120 (1)	10.8118 (3)
Error		NS	NS	NS	SD
Annotation					

Mass no.	Nuclidic mass	63BIE1	68AGY1	68AGY1	69BIE1
10	10.0129380	20.14 (2)	19.58 (3)	20.05 (3)	19.824 (20)
11	11.0093053	79.86 (2)	80.42 (3)	79.95 (3)	80.176 (20)
Isotope ratio 11/10		3.965	4.108 (8)	3.987 (8)	4.0444 (52)
Atomic weight		10.8086 (2)	10.8142 (3)	10.8095 (3)	10.8118 (2)
Error		SD	2XSE	2XSE	3XSD
Annotation					C

Element $_5$B Boron--continued

Mass no.	Nuclidic mass	70CAT1	71GEN1	73NOM1	73TAM1
10	10.0129380	19.827 (13)	19.9 (2)[c]	19.85 (1)[c]	19.83 (3)[c]
11	11.0093053	80.173 (13)	80.1 (2)[c]	80.15 (1)[c]	80.17 (3)[c]
Isotope ratio 11/10		4.0436 (33)	4.03 (4)	4.039 (2)	4.042 (5)
Atomic weight		10.8118 (2)	10.811 (2)	10.8115 (1)	10.8117 (3)
Error		3XSD	SD	SD	SD
Annotation		C,B			

Mass no.	Nuclidic mass	79KAN1	83ICA1
10	10.0129380	19.74 (2)	19.9 (2)
11	11.0093053	80.26 (2)	80.1 (2)
Isotope ratio 11/10		4.066 (4)	4.025
Atomic weight		10.8126 (2)	10.810 (2)
Error		SD	
Annotation			

Element $_6$C Carbon

1961 12.01115 (5) 1969 12.011

Mass no.	Nuclidic mass	37BRO1	39NIE3	39NIE3	41MUR2
12	12.	98.927 (43)[c]	98.866 (23)[c]	98.900 (22)[c]	98.891 (22)[c]
13	13.003354839	1.073 (43)[c]	1.134 (23)[c]	1.100 (22)[c]	1.109 (22)[c]
Isotope ratio 12/13		92.2 (3.7)	87.2 (1.8)	89.9 (1.8)	89.2 (1.8)
Atomic weight		12.0108 (4)	12.0114 (2)	12.0110 (2)	12.0111 (2)
Error		NS	SD	SD	NS
Annotation					

Mass no.	Nuclidic mass	41MUR2	48RAN1	48RAN1	48RAN2
12	12.	98.937 (21)[c]	98.9350 (52)	98.8814 (55)	98.881
13	13.003354839	1.063 (21)[c]	1.0650 (52)	1.1186 (55)	1.119
Isotope ratio 12/13		93.7 (1.8)	92.9 (5)	88.4 (5)	88.4
Atomic weight		12.0107 (2)	12.01069 (5)	12.01122 (6)	12.01123 (1)
Error		NS	NS	NS	NS
Annotation					

Element $_{6}C$ Carbon--continued

Mass no.	Nuclidic mass	48RAN2	50TRO1	50BEC1	50NIE1
12	12.	98.937	98.891	98.876 (5)	98.892 (4)
13	13.003354839	1.063	1.109	1.124 (5)	1.108 (4)
Isotope ratio 12/13		93.1	89.17	87.97	89.25
Atomic weight		12.01067 (1)	12.01113 (1)	12.01128 (5)	12.01112 (4)
Error		NS	NS	NS	P
Annotation					

Mass no.	Nuclidic mass	51MAR1	51MAR1	51WIC1	51WIC1
12	12.	98.930 (11)[C]	98.878 (11)[C]	98.8787 (13)[C]	98.881 (12)[C]
13	13.003354839	1.070 (11)[C]	1.122 (11)[C]	1.1213 (13)[C]	1.119 (12)[C]
Isotope ratio 12/13		92.5 (1.0)	88.1 (1.0)	88.18 (10)	88.36 (10)
Atomic weight		12.0107 (1)	12.0113 (1)	12.01125 (11)	12.0112 (1)
Error		NS	NS	NS	NS
Annotation					

Mass no.	Nuclidic mass	51WIC1	51WIC2	51WIC2	52DIB1
12	12.	98.8824 (12)[C]	98.9095 (36)[C]	98.8777 (38)[C]	98.9130 (59)[C]
13	13.003354839	1.1176 (12)[C]	1.0905 (36)[C]	1.1223 (38)[C]	1.0870 (59)[C]
Isotope ratio 12/13		88.48 (10)	90.7 (3)	88.1 (3)	91.0 (5)
Atomic weight		12.01121 (1)	12.01094 (4)	12.01126 (4)	12.01091 (6)
Error		NS	NS	NS	2XSD
Annotation					

Mass no.	Nuclidic mass	52WIC1	52WIC1	53CRA1	53CRA1
12	12.	98.9181 (12)[C]	98.8912 (12)[C]	98.87678 (25)[C]	98.92658 (23)[C]
13	13.003354839	1.0819 (12)[C]	1.1088 (12)[C]	1.12322 (25)[C]	1.07342 (23)[C]
Isotope ratio 12/13		91.43 (10)	89.19 (10)	88.03 (2)	92.16 (2)
Atomic weight		12.01086 (1)	12.01112 (1)	12.011270 (2)	12.010770 (2)
Error		NS	NS	P	P
Annotation					

Element $_{6}C$ Carbon--continued

Mass no.	Nuclidic Mass	53DAN1	53DAN1	53DAN1	53DAN1
12	12.	98.88691 (74)[c]	98.9116 (71)[c]	98.8982 (74)[c]	98.8885 (76)[c]
13	13.003354839	1.11309 (74)[c]	1.0884 (71)[c]	1.1018 (74)[c]	1.1115 (76)[c]
Isotope ratio 12/13		88.84 (6)	90.88 (6)	88.76 (6)	87.97 (6)
Atomic weight		12.011168 (7)	12.0109201 (7)	12.01105 (7)	12.01115 (8)
Error		NS	NS	NS	NS
Annotation					

Mass no.	Nuclidic mass	53WIC1	53WIC1	55LAN1	55LAN1
12	12.	98.9128 (12)[c]	98.8746 (13)[c]	98.9143 (14)[c]	98.8953 (20)[c]
13	13.003354839	1.0872 (12)[c]	1.1254 (13)[c]	1.0857 (14)[c]	1.1047 (20)[c]
Isotope ratio 12/13		90.98 (10)	87.86 (10)	91.11 (12)	89.52 (16)
Atomic weight		12.01091 (1)	12.01129 (1)	12.01089 (1)	12.01108 (2)
Error		2XSD	2XSD	SD	SD
Annotation					

Mass no.	Nuclidic mass	57CRA1	57GAV1	57GAV1
12	12.	98.889 (3)[c]	98.91892 (58)[c]	98.90074 (50)[c]
13	13.003354839	1.111 (3)[c]	1.08108 (58)[c]	1.09926 (60)[c]
Isotope ratio 12/13		89.05 (27)	91.50 (5)	89.97 (5)
Atomic weight		12.01115 (3)	12.010847 (6)	12.011029 (6)
Error		P	NS	NS
Annotation		B		

Mass No.	Nuclidic Mass	83ICA1
12	12.	98.90 (3)
13	13.003354839	1.10 (3)
Isotope Ratio 12/13		89.91
Atomic Weight		12.0110 (3)
Error		
Annotation		

Element $_{7}$N Nitrogen

1961 14.0067

Mass no.	Nuclidic mass	50NIE1	58JUN1	63PIL1	63PIL1
14	14.003074008	99.6350 (13)[c]	99.63370 (40)[c]	99.6366 (53)[c]	99.6361
15	15.000108978	0.3650 (13)[c]	0.36630 (40)[c]	0.3634 (53)[c]	0.3639
Isotope ratio 14/15		273 (1)	272.0 (3)	274.1 (4)	273.8 (4)
Atomic weight		14.00671 (1)	14.006726 (4)	14.006697 (5)	14.00670 (5)
Error		P	NS	NS	NS
Annotation			C, B		

Mass no.	Nuclidic mass	63PIL1	83ICA1
14	14.003074008	99.6353 (5)[c]	99.634 (9)
15	15.000108978	0.3647 (5)[c]	0.366 (9)
Isotope ratio 14/15		273.2 (4)	272.2
Atomic weight		14.006710 (5)	14.00672 (9)
Error		NS	
Annotation			

Element $_{8}$O Oxygen

1961 15.9994 1969 15.9994 (3)

Mass no.	Nuclidic mass	41MUR1	44THO1	49HIB1	49HIB2
16	15.99491464	99.7598 (74)[c]	99.7574 (37)[c]	99.770 (5)	99.775 (6)
17	16.9991306	0.0407 (20)[c]	0.03920 (80)[c]	0.035 (9)	0.035 (8)
18	17.99915939	0.1995 (60)[c]	0.2034 (6)[c]	0.196 (10)	0.190 (10)
Isotope ratio 16/18, 17/18		500. (15) 0.204 (8)	490.4 (8.6) 0.193 (5)	509 0.179	525 0.184
Atomic weight		15.9993 (1)	15.99938 (5)	15.99919 (3)	15.99907 (3)
Error		NS	NS	SD	SD
Annotation					

Element $_{8}$O OXYGEN--continued

Mass no.	Nuclidic mass	50NIE1	50NIE1	76BAE1	83ICA1
16	15.99491464	99.75769 (50)[C]	99.75873 (70)[C]	99.7628 (5)[C]	99.762 (15)
17	16.9991306	0.03766 (10)[C]	0.03736 (50)[C]	0.0372 (4)[C]	0.038 (3)
18	17.99915939	0.20465 (50)[C]	0.20391 (50)[C]	0.200045 (5)	0.200 (12)
Isotope ratio 16/18, 17/18		487.44 (58) 0.1840 (3)	489.24 (59) 0.1832 (12)	498.7 (2.2) *0.1860*	498.8 *0.190*
Atomic weight		15.99939 (1)	15.99938 (1)	15.999296 (6)	15.9993 (3)
Error		P	P	SD	
Annotation				C, B	

Element $_{9}$F Fluorine

1961 18.9984 1971 18.99840 1975 18.998403

Mass no.	Nuclidic mass	20AST1	83ICA1
19	18.99840325	100	100
Isotope ratio		—	—
Atomic weight		18.9984032 (8)	18.9984032 (8)
Error		NS	
Annotation			

Element $_{10}$Ne Neon

1961 20.183 1967 20.179 (3) 1979 20.179

Mass no.	Nuclidic mass	47DIB1	49HIB2	50NIE2	58WAN1
20	19.9924391	90.51 (15)	89.99 (3)	90.92 (4)	90.87 (9)
21	20.9938453	0.29 (2)	0.30 (1)	0.257 (1)	0.31 (3)
22	21.9913837	9.21 (18)	9.72 (1)	8.82 (14)	8.82 (6)
Isotope ratio 21/20, 22/20		0.0032 0.1018	0.0033 0.1080	0.002827 (6) 0.09703 (40)	0.0034 0.0971
Atomic weight		20.179 (3)	20.1897 (4)	20.1713 (8)	20.172 (2)
Error		*SD*	*SD*	*3XP*	*SD*
Annotation					

Element $_{10}$Ne Neon--continued

Mass no.	Nuclidic mass	65EBEl	66WALl	71MELl	83ICAl
20	19.9924391	90.50 (7)	90.514 (31)	90.512 (8)	90.51 (9)
21	20.9938453	0.268 (2)	0.266 (5)	0.267 (1)	0.27 (2)
22	21.9913837	9.23 (7)	9.220 (29)	9.221 (6)	9.22 (9)
Isotope ratio	21/20,	0.002959 (22)	0.002935 (58)	0.00295	0.00298
	22/20	0.10204 (83)	0.10187 (38)	0.10188	0.1019 (for air only)
Atomic weights		20.179 (1)	20.1794 (6)	20.1794 (6)	20.179 (2)
Error		3XSE	NS	NS	
Annotation		C	C, B		

Element $_{11}$Na Sodium

1961 22.9898 1971 22.98977

Mass no.	Nuclidic mass	56WHIl	83ICAl
23	22.9897697	100	100
Isotope ratio			
Atomic weight		22.989770 (5)	22.989770 (5)
Error		NS	
Annotation			

Element $_{12}$Mg Magnesium

1961 24.312 1967 24.305

Mass no.	Nuclidic mass	48HIBl	48HIBl	48WHIl	56WHIl
24	23.9850450	78.98 (4)	78.97 (3)	78.60 (13)	78.8 (2)
25	24.9858392	10.05 (2)	10.01 (2)	10.11 (5)	10.15 (1)
26	25.9825954	10.97 (4)	11.02 (4)	11.29 (8)	11.06 (1)
Isotope ratio	25/24,	0.1273	0.1268	0.1286	0.1288
	26/24	0.1389	0.1397	0.1436	0.1404
Atomic weight		24.3048 (8)	24.3054 (7)	24.312 (2)	24.308 (3)
Error		SE	SE	SD	NS
Annotation					

Element $_{12}$Mg Magnesium--continued

Mass no.	Nuclidic mass	60OMU1	64SHI2	64SHI2	66CAT1
24	23.9850450	78.60 (4)	78.907 (36)[c]	78.945 (40)[c]	78.992 (25)
25	24.9858392	10.15 (3)	10.059 (36)[c]	10.029 (36)[c]	10.003 (9)
26	25.9825954	11.31 (4)	11.034 (22)[c]	11.026 (28)[c]	11.005 (19)
Isotope ratio	25/24,	.1291	0.12748 (5)	0.12704 (5)	0.12663 (13)
	26/24	.1439	0.13984 (5)	0.13966 (4)	0.13932 (26)
Atomic weight		24.3123 (7)	24.3061 (5)	24.3057 (6)	24.3050 (4)
Error		NS	NS	NS	3XSD
Annotation					C, B

Mass no.	Nuclidic mass	67TAK1	70SCH1	74LEE1	77LEE1
24	23.9850450	79.12 (8)[c]	78.962 (20)[c]	74.963 (20)[c]	78.962 (20)[c]
25	24.9858392	9.99 (7)[c]	9.999 (10)[c]	9.999 (10)[c]	9.999 (10)[c]
26	25.9825954	10.99 (7)[c]	11.039 (10)[c]	11.038 (11)[c]	11.039 (10)[c]
Isotope ratio	25/24,	0.1261 (8)	0.12663	0.12663	0.12663
	26/24	0.1389 (6)	0.139805 (13)	0.139805 (13)	0.139805 (13)
Atomic weight		24.329 (1)	24.3056 (3)	24.3056 (3)	24.3056 (3)
Error		SE	2XSD	2XSE	2XSE
Annotation					

Mass no.	Nuclidic mass	79ESA1	83ICA1
24	23.9850450	78.962	78.99 (3)
25	24.9858392	9.999	10.00 (1)
26	25.9825954	11.039	11.01 (2)
Isotope ratio	25/24,	0.12663	0.12660
	25/24	0.139805	0.13938
Atomic weight		24.3056 (3)	24.3051 (5)
Error			
Annotation		NS	

Element $_{13}$Al Aluminum

1961 26.9815 1971 26.98154

Mass no.	Nuclidic mass	56WHI1	83ICA1
27	26.9815413	100	100
Isotope ratio			
Atomic weight		26.981541 (4)	26.981541 (4)
Error		NS	
Annotation			

Element $_{14}$Si Silicon

1961 28.086 1969 28.086 (3) 1975 28.0855 (3)

Mass no.	Nuclidic mass	46ING1	46NEY1	46WIL1	48WHI1
28	27.9769284	92.28 (8)	92.24 (10)	92.268 (19)[c]	92.16 (6)
29	28.9764964	4.67 (5)	4.69 (5)	4.678 (18)[c]	4.71 (3)
30	29.9737717	3.05 (3)	3.07 (5)	3.0541 (90)[c]	3.13 (4)
Isotope ratio	29/28	0.0506	0.0508	0.0507 (2)	0.0511
	30/28	0.0330	0.0333	0.0331 (1)	0.0340
Atomic weight		28.084 (1)	28.085 (1)	28.0847 (2)	28.086 (1)
Error		NS	NS	NS	SE
Annotation					

Mass no.	Nuclidic mass	49HIB2	52DIB1	52NOR1	53REY1
28	27.9769284	92.19 (6)	92.41 (3)	92.14 (20)[c]	92.18 (3)
29	28.9764964	4.70 (3)	4.57 (5)	4.73 (10)	4.71 (2)
30	29.9737717	3.12 (4)	3.01 (5)	3.13 (10)	3.12 (2)
Isotope ratio	29/28	0.0510	0.0494	0.0513	0.0511
	30/28	0.0338	0.0326	0.0340	0.0338
Atomic weight		28.086 (1)	28.0827 (6)	28.087 (3)	28.0863 (5)
Error		SD	NS	NS	P
Annotation					

Element $_{14}$Si Silicon--continued

Mass no.	Nuclidic mass	75BAR2	83ICA1
28	27.9769284	92.22933 (155)	92.23 (1)
29	28.9764964	4.66982 (124)	4.67 (1)
30	29.9737717	3.10085 (74)	3.10 (1)
Isotope ratio	29/28	0.050633	0.05063
	30/28	0.033621	0.03361
Atomic weight		28.08553 (2)	28.0855 (2)
Error		3XSD	
Annotation		C, B	

Element $_{15}$P Phosphorus

1961 30.9738 1971 30.97376

Mass no.	Nuclidic mass	63LEI1	83ICA1
31	30.9737634	100	100
Isotope ratio			
Atomic weight		30.973763 (4)	30.973763 (4)
Error		NS	
Annotation			

Element $_{16}$S Sulfur

1961 32.064 (3) 1969 32.06 1983 32.066 (6)

Mass no.	Nuclidic mass	38NIE2	49HER1	49TRO1
32	31.9720718	95.061 (83)[C]	94.84	94.89
33	32.9714591	0.741 (15)[C]	0.84	0.759
34	33.96786774	4.183 (82)[C]	4.26	4.34
36	35.9670790	0.01521 (15)[C]	0.05	0.0136
Isotope ratio	33/32	0.0078 (2)	0.009	0.008
	34/32	0.044 (1)	0.045	0.0456
	36/32	0.000166 (16)	0.0005	0.0001
Atomic weight		32.064 (2)	32.0675 (4)	32.0668 (2)
Error		NS	NS	NS
Annotation				

Element $_{16}$S Sulfur--continued

Mass no.	Nuclidic Mass	50HER1	50MAC1	56BRA1	83ICA1
32	31.9720718	95.00 (3)	95.018	95.0	95.02 (9)
33	32.9714591	0.74 (2)	0.750	0.760 (4)	0.75 (1)
34	33.96786774	4.24 (2)	4.215	4.22 (1)	4.21 (8)
36	35.9670790	0.017 (3)	0.017	0.014	0.02 (1)
Isotope ratio	33/32	0.0078	0.0079	0.008	0.008
	34/32	0.0446	0.0444	0.044	0.044
	36/32	0.00018	0.00018	0.0001	0.0002
Atomic weight		32.0648 (4)	32.06437 (4)	32.0663 (2)	32.064 (2)
Error		SD	P	NS	
Annotation			B		

Element $_{17}$Cl Chlorine

1961 35.453

Mass no.	Nuclidic mass	36NIE1	55BOY1	55OWE1	61MEY1
35	34.968852729	75.4 (2)[C]	75.529 (16)	75.79 (18)[C]	75.80 (6)
37	36.965902624	24.6 (2)[C]	24.471 (16)	24.21 (18)[C]	24.20 (6)
Isotope ratio 35/37		3.07 (3)	3.0865 (27)	3.13 (3)	3.132
Atomic weight		35.460 (4)	35.4575 (3)	35.452 (4)	35.452 (1)
Error		NS	SD	NS	SE
Annotation					

Mass no.	Nuclidic mass	62SHI2	83ICA1
35	34.968852729	75.7705 (450)	75.77 (5)
37	36.965902624	24.2295 (450)	24.23 (5)
Isotope ratio 35/37		$3.1272^{+0.0079}_{-0.0082}$	3.1271
Atomic weight		35.4527 (9)	35.453 (1)
Error		3XSD	
Annotation		C,B	

Element $_{18}$Ar Argon

1961 39.948 1969 39.948 1979 39.948

Mass no.	Nuclidic mass	47DIBI	50NIEI	50NIEI	71MELI
36	35.967545605	0.35 (1)	0.33645 (60)[c]	0.33327 (60)[c]	0.339 (1)
38	37.9627322	0.08 (1)	0.06325 (10)[c]	0.06275 (10)[c]	0.064 (1)
40	39.9623831	99.57 (3)	99.60030 (60)[c]	99.60397 (60)[c]	99.597 (1)
Isotope ratio 36/40		0.0035	0.003378 (6)	0.003346 (6)	0.00340
38/40		0.0008	0.000635 (1)	0.000630 (1)	0.00064
Atomic Weight		39.9468 (9)	39.94768 (2)	39.94781 (2)	39.94756 (3)
Error		SD	P	P	NS
Annotation			C, B	C	

Mass no.	Nuclidic mass	83ICAI
36	35.967545605	0.337 (3)
38	37.9627322	0.063 (1)
40	39.9623831	99.600 (3) (for air only)
Isotope ratio 36/40		
38/40		
Atomic weight		39.9477 (1)
Error		
Annotation		

Element $_{19}$K Potassium

1961 39.102 1969 39.102 (3) 1921 39.098 (3) 1975 39.0983 (3) 1979 39.0983

Mass no.	Nuclidic mass	35BREI	35NIEI	48HIBI	50NIEI
39	38.9637079	93.43 (2)[c]	93.31 (1)[c]	93.25 (7)	93.081 (4)
40	39.9639988	0.0112 (2)[c]	0.0108 (11)[c]	0.010 (2)	0.0119 (1)
41	40.9618254	6.56 (2)[c]	6.68 (1)[c]	6.75 (7)	6.91 (4)
Isotope ratio 39/41		14.25 (3)	13.96 (1)	13.81	13.48 (7)
40/41		0.00171 (2)	0.00161 (16)	0.0015	0.001725 (17)
Atomic weight		39.0949 (4)	39.0973 (2)	39.099 (1)	39.1019 (6)
Error		NS	NS	SE	P
Annotation					

Element $_{19}K$ Potassium--continued

Mass no.	Nuclidic mass	52REU1	56REU1	56WHI1	60KEN1
39	38.9637079	93.462 (21)[c]	93.126 (42)[c]	93.23 (5)	93.219 (14)[c]
40	39.9639988	0.0118 (1)	0.011730 (47)[c]	0.0118 (2)	0.011750 (65)[c]
41	40.9618254	6.526 (21)[c]	6.862 (43)[c]	6.76 (5)	6.770 (14)[c]
Isotope ratio 39/41		14.32 (5)	13.57 (9)	13.79	13.77 (3)
40/41		0.00181 (1)	0.001710 (2)	0.00175	0.00174 (1)
Atomic weight		39.0939 (4)	39.1009 (8)	39.099 (1)	39.0991 (3)
Error		SE	P	NS	P
Annotation					

Mass no.	Nuclidic mass	60MU1	62HAR1	62STA1	68SHI1
39	38.9637079	93.19 (2)	93.46 (5)	93.423 (43)[c]	93.28 (10)
40	39.9639988	0.011 (1)	0.0115 (1)	0.01162 (6)[c]	0.0117 (2)
41	40.9618254	6.78 (2)	6.52 (6)	6.565 (43)[c]	6.70 (8)
Isotope ratio 39/41		13.74	14.33	14.23 (10)	13.92
40/41		0.001622	0.00176	0.00177 (2)	0.001746
Atomic weight		39.0993 (4)	39.094 (1)	39.0949 (8)	39.097 (2)
Error		NS	NS	NS	SD
Annotation					

Mass no.	Nuclidic mass	75GAR1	75IMA1	80IMA1	83ICA1
39	38.9637079	93.2581 (29)	93.29 (10)[c]	93.27 (30)[c]	93.2581 (30)
40	39.9639988	0.01167 (4)	0.0131 (2)[c]	0.01157 (6)[c]	0.0117 (1)
41	40.9618254	6.7302 (29)	6.69 (8)[c]	6.72 (3)[c]	6.7302 (30)
Isotope ratio 39/41		13.8566 (63)	13.94 (2)	13.877 (45)	13.857
0/41		0.0017343 (61)	0.001955 (27)	0.001722 (9)	0.001738
Atomic weight		39.09829 (6)	39.095 (2)	39.098 (4)	39.09830 (6)
Error		3xSD	SD	SD	
Annotatior		C, B			

Element $_{20}$Ca Calcium

1961 40.08 1983 40.078 (4)

Mass no.	Nuclidic mass	38NIE2	48WHI1	60OMU1	62STA1
40	39.9625907	96.961 (60)	96.92 (3)	96.89 (4)	96.959 (13)[c]
42	41.9586218	0.640 (19)	0.64 (1)	0.66 (1)	0.6485 (41)[c]
43	42.9587704	0.1454 (48)	0.132 (4)	0.18 (1)	0.13280 (69)[c]
44	43.9554848	2.065 (57)	2.13 (4)	2.03 (1)	2.0718 (86)[c]
46	45.953689	0.00330 (48)	0.0032	0.0023 (2)	0.003150 (34)[c]
48	47.952532	0.1852 (58)	0.179 (1)	0.23 (2)	0.1850 (11)[c]
Isotope ratio 40/44		46.954	45.50	47.73	46.8 (2)
42/44		0.310	0.30	0.325	0.313 (1.5)
43/44		0.070	0.06	0.0887	0.0641 (2)
46/44		0.0016	0.0015	0.00113	0.00152 (1.5)
48/44		0.090	0.08	0.113	0.0893 (4)
Atomic weight		40.077 (2)	40.079 (2)	40.081 (2)	40.0773 (3)
Error		NS	SD	NS	NS
Annotation					

Mass no.	Nuclidic mass	64BAC1	68SHI1	71COL1	72MOO1
40	39.9625907	96.88 (5)	96.87 (99)[c]	96.8918 (200)[c]	96.941 (1)[c]
42	41.9586218	0.655 (6)	0.660 (8)[c]	0.6562 (19)[c]	0.647 (1)[c]
43	42.9587704	0.138 (2)	0.136 (2)[c]	0.1312 (13)[c]	0.135 (1)[c]
44	43.9554848	2.12 (4)	2.133 (4)[c]	2.1202 (5)[c]	2.086 (1)[c]
46	45.953689	0.0046 (10)	0.0034 (1)[c]	0.0034 (4)[c]	0.004 (1)[c]
48	47.952532	0.200 (6)	0.199 (3)[c]	0.1972 (40)[c]	0.187 (1)[c]
Isotope ratio 40/44		45.70	45.41 (60)	45.70	46.480 (87)
42/44		0.309	0.3096 (37)	0.3095 (9)	0.3104 (11)
43/44		0.065	0.0637 (9)	0.0619 (6)	0.0648 (9)
46/44		0.002	0.00160 (2)	0.0016 (2)	0.0017 (5)
48/44		0.094	0.0935 (12)	0.093 (2)	0.0898 (6)
Atomic Weight		40.080 (2)	40.081 (1)	40.0802 (3)	40.0780 (1)
Error		SD	SD	NS	2XSD
Annotation					B

Element $_{20}$Ca Calcium--continued

Mass no.	Nuclidic mass	78RUS1	80ROS1	83ICA1
40	39.9625907	96.98213 (617)[c]	96.980 (1)	96.941 (13)
42	41.9586218	0.64214 (4)[c]	0.648 (1)	0.647 (3)
43	42.9587704	0.13340 (2)[c]	0.135 (1)	0.135 (3)
44	43.9554848	2.05675 (13)[c]	2.095 (1)	2.086 (5)
46	45.953689	0.00313 (2)[c]	0.003 (1)	0.004 (3)
48	47.952532	0.18245 (4)[c]	0.189 (1)	0.187 (3)
Isotope ratio	40/44	47.153 (3)	46.266 (28)	46.472
	42/44	0.31221 (2)	0.3094 (4)	0.31016
	43/44	0.06486 (1)	0.0644 (5)	0.06472
	46/44	0.00152 (1)	0.0015 (4)	0.00192
	48/44	0.08871 (2)	0.0901 (5)	0.08965
Atomic weight		40.07629 (1)	40.0785 (1)	40.0780 (4)
Error		2XSE	2XSD	
Annotation				

Element $_{21}$Sc Scandium

1961 44.956 1969 44.9559 1983 44.95591

Mass no.	Nuclidic mass	50LEL1	83IAC1
45	44.9559136	100	100
Isotope ratio			
Atomic weight		44.955914 (9)	44.955914 (9)
Error		NS	
Annotation			

Element $_{22}$Ti Titanium

1961 47.90 1969 47.90 (3) 1979 47.88 (3)

Mass no.	Nuclidic mass	38NIE2	49HER1	49HER1	52MAT1
46	45.9526327	7.95 (15)[c]	8.22 (13)	7.92 (7)	7.87
47	46.9517649	7.76 (14)[c]	7.42 (5)	7.50 (7)	7.25
48	47.9479467	73.45 (20)[c]	73.38 (11)	73.09 (13)	73.9
49	48.9478705	5.51 (11)[c]	5.56 (4)	5.90 (13)	5.56
50	49.9447858	5.34 (11)[c]	5.41 (5)	5.59 (11)	5.43
Isotope ratio	46/48	0.1082 (22)	0.1120	0.1084	0.1065
	47/48	0.1056 (21)	0.1011	0.1026	0.0981
	49/48	0.0750 (15)	0.0758	0.0807	0.0752
	50/48	0.0727 (14)	0.0737	0.0765	0.0735
Atomic weight		47.873 (4)	47.874 (3)	47.886 (3)	47.8827 (3)
Error		P	2XSD	2XSD	NS
Annotation					

Mass no.	Nuclidic mass	54HOG1	58DRA1	68BEL1	68IMA1	79HEY1
46	45.9526327	7.99 (2)	8.00 (5)	8.24 (45)	8.01 (5)[c]	8.0242 (27)
47	46.9517649	7.32 (2)	7.29 (4)	7.44 (22)	7.34 (4)[c]	7.3362 (27)
48	47.9479467	73.99 (7)	73.98 (8)	73.71 (18)	73.80 (8)[c]	73.8066 (110)
49	48.9478705	5.46 (2)	5.38 (5)	5.43 (16)	5.49 (3)[c]	5.4912 (27)
50	49.9447858	5.25 (5)	5.35 (4)	5.18 (31)	5.36 (3)[c]	5.3418 (27)
Isotope ratio	46/48	0.1080	0.1081	0.1118	0.10858	0.10872 (4)
	47/48	0.0989	0.0985	0.1009	0.09943	0.09940 (5)
	49/48	0.0738	0.0727	0.0737	0.07442	0.07440 (5)
	50/48	0.0710	0.0723	0.0703	0.07258 (38)	0.07238 (5)
Atomic weight		47.875 (1)	47.876 (1)	47.87 (1)	47.877 (1)	47.87633 (9)
Error		SD	SE	SD	SD	3XSE
Annotation				C, B		

Element $_{22}$Ti Titanium--continued

Mass no.	Nuclidic mass	80NIE1	81NIE1	83ICA1
46	45.9526327	8.0124	7.9957	8.0 (1)
47	46.9517649	7.3309	7.3159	7.3 (1)
48	47.9479467	73.8145	73.6765	73.8 (1)
49	48.9478705	5.4964	5.5228	5.5 (1)
50	49.9447858	5.3458	5.4891	5.4 (1)
Isotope ratio	46/48	0.108548	0.10952	0.1111
	47/48	0.099315 (5)	0.09930	0.1003
	49/48	0.074463 (4)	0.07496	0.0732
	50/48	0.072422 (4)	0.07450	0.0705
Atomic weight		47.87675 (1)	47.880360 (3)	47.878 (3)
Error		2XSD	NS	
Annotation				

Element $_{23}$V Vanadium

1961 50.942 1969 50.9414 (3) 1977 50.9415

Mass no.	Nuclidic mass	49HES1	49HES1	49HES1	49HES1
50	49.9471613	0.273 (4)	0.27 (3)[c]	0.27 (3)[c]	0.255 (4)
51	50.9439625	99.727 (4)	99.73 (3)[c]	99.73 (3)[c]	99.745 (4)
Isotope ratio	50/51	0.00274 (4)	0.00271 (27)	0.00268 (26)	0.00256 (4)
Atomic weight		50.94124 (4)	50.9413 (3)	50.9413 (3)	50.94142 (4)
Error		SE	SE	SE	SE
Annotation					

Mass no.	Nuclidic mass	49HES1	49LEL2	50HER1	56WHI1
50	49.9471613	0.253 (50)[c]	0.23 (1)	0.28 (2)	0.25 (1)
51	50.9439625	99.747 (50)[c]	99.77 (1)	99.72 (2)	99.75 (1)
Isotope ratio	50/51	0.00254 (5)	0.00230	0.00281	0.00251
Atomic weight		50.94209 (5)	50.9417 (1)	50.9412 (2)	50.9415 (1)
Error		SE	NS	2XSD	NS
Annotation					

Element $_{23}V$ Vanadium--continued

Mass no.	Nuclidic mass	63SVE1	64FLE1	66FLE1	68IMA1	69BAL1
50	49.9471613	0.2497 (12)[c]	0.2497 (12)[c]	0.2497 (6)[c]	.250 (2)[c]	0.2419 (30)[c]
51	50.9439625	99.7503 (12)[c]	99.7503 (12)[c]	99.7503 (6)[c]	99.750 (2)[c]	99.7581 (30)[c]
Isotope ratio 50/51		0.002503 (12)	0.002503 (10)	0.002503 (6)	0.002506 (38)	0.002425 (30)
Atomic weight		50.94147 (1)	50.94147 (1)	50.941473 (6)	50.94147 (2)	50.94155 (3)
Error		NS	SE	SE	SD	NS
Annotation			C, B	C		

Mass no.	Nuclidic mass	70PEL1	80IMA1	83ICA1
50	49.9471613	0.2444 (17)[c]	.2500 (3)[c]	0.250 (2)
51	50.9439625	99.756 (17)[c]	99.7500 (3)[c]	99.750 (2)
Isotope ratio 50/51		0.002450 (17)	0.002506 (12)	0.002506
Atomic weight		50.94173 (2)	50.941470 (3)	50.94147 (2)
Error		NS	SD	
Annotation				

Element $_{24}Cr$ Chromium

1961 51.996 1983 51.9961 (6)

Mass no.	Nuclidic mass	39NIE2	48ING4	48WHI1	49HIB2	60FLE1
50	49.9460463	4.49	4.51 (8)	4.31 (4)	4.41 (6)	4.352 (24)
52	51.9405097	83.78	83.52 (30)	83.76 (14)	83.46 (11)	83.764 (36)
53	52.9406510	9.43	9.55 (20)	9.55 (9)	9.54 (6)	9.509 (27)
54	53.9388822	2.30	2.42 (4)	2.38 (2)	2.61 (9)	2.375 (18)
Isotope ratio 50/52		0.0536	0.0540	0.0515	0.0528	0.0520
53/52		0.1126	0.1143	0.1140	0.1143	0.1135
54/52		0.0275	0.0290	0.0284	0.0313	0.0283
Atomic weight		51.9912 (3)	51.994 (3)	51.998 (1)	52.000 (2)	51.9959 (3)
Error		NS	NS	SD	SD	3XSD
Annotation						

Element $_{24}$Cr Chromium--continued

Mass no.	Nuclidic Mass	60OMU1	62SVE1	66SHI1	66SHI3	73BAR1
50	49.9460463	4.37 (3)	4.357 (5)	4.3452 (85)	4.354 (15)	4.34 (1)[c]
52	51.9405097	83.86 (8)	83.760 (9)	83.7895 (117)	83.803 (32)	83.80 (1)[c]
53	52.9406510	9.44 (9)	9.508 (7)	9.5006 (110)	9.507 (27)	9.50 (1)[c]
54	53.9388822	2.36 (3)	2.375 (5)	2.3647 (48)	2.336 (8)	2.36 (1)[c]
Isotope ratio	50/52	0.0521	0.0520	0.051859 (100)	0.05196	0.05186 (13)
	53/52	0.1126	0.1135	0.113386 (145)	0.1134	0.11339 (14)
	54/52	0.0281	0.0284	0.028222 (48)	0.02787	0.01822 (7)
Atomic weight		51.995 (1)	51.9962 (2)	51.9961 (2)	51.9954 (4)	51.9961 (3)
Error		NS	SE	3XSD	2XSD	2XSD
Annotation			C	C, B		

Mass no.	Nuclidic mass	75TAM1	83ICA1
50	49.9460463	4.353 (4)[c]	4.345 (9)
52	51.9405097	83.815 (35)[c]	83.789 (12)
53	52.9406510	9.479 (33)[c]	9.501 (11)
54	53.9388822	2.353 (16)[c]	2.365 (5)
Isotope ratio	50/52	0.05194 (5)	0.0519
	53/52	0.1131 (4)	0.1134
	54/52	0.02807 (19)	0.0282
Atomic weight		51.9955 (4)	51.9961 (2)
Error		SD	
Annotation			

Element $_{25}$Mn Manganese

1961 54.9380

Mass no.	Nuclidic mass	63LEI1	83ICA1
55	54.9380463	100	100
Isotope ratio			
Atomic weight		54.93805 (1)	54.93805 (1)
Error		NS	
Annotation			

Element $_{26}$Fe Iron

1961 55.847 (3)

Mass no.	Nuclidic mass	39NIE2	41VAL1	47VAL1	48WHI1
54	53.9396121	6.04	5.84	5.81 (1)[c]	5.81 (1)
56	55.9349393	91.57	91.68	91.75 (1)[c]	91.64 (2)
57	56.9353957	2.11	2.17	2.15 (1)[c]	2.21 (1)
58	57.9332778	0.28	0.31	0.29 (1)[c]	0.34 (1)
Isotope ratio	54/56	0.066	0.0631	0.0634	0.0634
	57/56	0.023	0.0237	0.0234	0.0241
	58/56	0.003	0.0034	0.0032	0.0037
Atomic weight		55.8411 (3)	55.8463 (3)	55.8463 (3)	55.8479 (3)
Error		NS	NS	SE	SE
Annotation				B	

Mass no.	Nuclidic mass	49HIB2	64CHE2	65SHI2	65SHI2	83ICA1
54	53.9396121	5.903 (15)	5.83 (5)	5.773 (61)[c]	5.818 (52)[c]	5.8 (1)
56	55.9349393	91.52 (2)	91.75 (5)	91.785 (65)[c]	91.760 (54)[c]	91.72 (30)
57	56.9353957	2.245 (11)	2.14 (2)	2.139 (27)[c]	2.129 (18)[c]	2.2 (1)
58	57.9332778	0.335 (3)	0.28 (1)	0.3029 (92)[c]	0.2936 (92)[c]	0.28 (1)
Isotope ratio	54/56	0.0645	0.0635	0.0629 (7)	0.0634 (6)	0.0632
	57/56	0.0245	0.0233	0.0233 (3)	0.0232 (2)	0.0240
	58/56	0.0037	0.0035	0.0033 (1)	0.0032 (1)	0.0033
Atomic weight		55.8463 (3)	55.846 (1)	55.847 (1)	55.846 (1)	55.847 (3)
Error		SD	NS	NS	NS	
Annotation						

Element $_{27}$Co Cobalt

1961 58.9332

Mass no.	Nuclidic mass	63LEI1	83ICA1
59	58.9331978	100	100
Isotope ratio			
Atomic weight		58.93320 (1)	58.93320 (1)
Error		NS	
Annotation			

Element $_{28}$Ni Nickel

1961 58.71 1969 58.71 (3) 1973 58.70 1979 58.69

Mass no.	Nuclidic mass	41STR1	41VAL2	44EWA2	48ING4
58	57.9353471	62.85 (81)	67.4	69.18 (69)	67.92 (15)
60	59.9307890	29.51 (88)	26.7	25.82 (52)	26.22 (12)
61	60.9310586	1.70 (13)	1.2	0.97 (3)	1.16 (2)
62	61.9283464	4.66 (28)	3.8	3.28 (6)	3.71 (3)
64	63.9279680	1.27 (10)	0.88	0.75 (3)	0.98 (2)
Isotope ratio	58/60	2.130	2.52	2.679	2.590
	61/60	0.058	0.045	0.038	0.044
	62/60	0.158	0.142	0.127	0.141
	64/60	0.043	0.033	0.029	0.037
Atomic weight		58.84 (2)	58.708 (4)	58.656 (9)	58.700 (2)
Error		NS	NS	P	NS
Annotation					

Mass no.	Nuclidic mass	48WHI1	52MAT1	73BAR1	80MOR1
58	57.9353471	67.76 (22)	68.0	68.274 (1)[C]	68.2812
60	59.9307890	26.16 (66)	26.3	26.095 (1)[C]	26.0974
61	60.9310586	1.25 (3)	1.13	1.134 (1)[C]	1.1295 (8)[C]
62	61.9283464	3.66 (1)	3.66	3.593 (1)[C]	3.5892 (10)[C]
64	63.9279680	1.16 (20)	1.01	0.904 (1)[C]	0.9027 (8)[C]
Isotope ratio	58/60	2.590	2.586	2.6164 (26)	2.6164
	61/60	0.048	0.043	0.04346 (43)	0.04328 (3)
	62/60	0.140	0.139	0.13769 (34)	0.13753 (4)
	64/60	0.044	0.038	0.03464 (35)	0.03459 (4)
Atomic weight		58.71 (1)	58.759 (2)	58.68767 (1)	58.68735 (6)
Error		SD	NS	2XSD	NS
Annotation				B	

Element $_{28}$Ni Nickel--continued

Mass no.	Nuclidic mass	82SHI1	83ICA1
58	57.9353471	68.2803	68.27 (1)
60	59.9307890	26.0967	26.10 (1)
61	60.9310586	1.1295	1.13 (1)
62	61.9283464	3.5878	3.59 (1)
64	63.9279680	0.9057	0.91 (1)
Isotope ratio	58/60	2.6164	2.616
	61/60	0.04328	0.043
	62/60	0.13748	0.137
	64/60	0.03471	0.035
Atomic weight		56.687464 (7)	58.688 (1)
Error		NS	
Annotation			

Element $_{29}$Cu Copper

1961 63.54 1965 63.546 1969 63.546 (3)

Mass no.	Nuclidic mass	44EWA1	47BRO1	47DUC1	47ING1
63	62.9295992	69.97 (29)	69.09	69.48 (16)	69.078 (38)[c]
65	64.9277924	30.03 (29)	30.91	30.52 (16)	30.921 (38)[c]
Isotope ratio 63/65		2.330 (32)	2.235	2.277 (17)	2.234 (4)
Atomic weight		63.530 (6)	63.5472 (2)	63.539 (3)	63.5468 (8)
Error		P	NS	P	NS
Annotation					

Mass no.	Nuclidic mass	48HES2	48ING4	48ING4	48WHI1
63	62.9295992	69.089 (95)[c]	69.43 (10)[c]	69.41 (10)	68.94 (19)
65	64.9277924	30.911 (95)[c]	30.57 (10)[c]	30.59 (10)	31.06 (19)
Isotope ratio 63/65		2.235 (10)	2.271 (11)	2.269	2.220
Atomic weight		63.547 (2)	63.540 (2)	63.541 (2)	63.550 (4)
Error		NS	NS	NS	SD
Annotation					

Element $_{29}$Cu Copper--continued

Mass no.	Nuclidic mass	50HIB1	51SOM1	58WAL1	58WAL1
63	62.9295992	68.98 (4)	68.94 (26)	68.992 (19)[c]	68.799 (19)[c]
65	64.9277924	31.02 (4)	31.06 (26)	31.008 (19)[c]	31.201 (19)[c]
Isotope ratio 63/65		2.224	2.220	2.225 (13)	2.205 (13)
Atomic weight		63.5494 (8)	63.550 (2)	63.5492 (4)	63.5531 (4)
Error		2XSD	NS	2XSD	2XSD
Annotation					

Mass no.	Nuclidic mass	62WHI1	64SHI1	65SHI1	65SHI1
63	62.9295992	69.23 (19)[c]	69.174 (20)	68.981 (32)	69.244 (31)
65	64.9277924	30.77 (19)[c]	30.826 (20)	31.019 (32)	30.756 (31)
Isotope ratio 63/65		2.25 (2)	2.2440 (2)	2.2238	2.2514
Atomic weight		63.544 (4)	63.5456 (4)	63.5494 (6)	63.5442 (6)
Error		NS	3XSD	3XSD	3XSD
Annotation			C, B		

Mass no.	Nuclidic mass	67KAN1	75MUR1	76MUR1	83ICA1
63	62.9295992	69.325 (98)[c]	69.51 (20)[c]	69.164 (40)[c]	69.17 (2)
65	64.9277924	30.675 (98)[c]	30.49 (20)[c]	30.836 (40)[c]	30.83 (2)
Isotope ratio 63/65		2.260 (8)	2.28 (1)	2.243 (5)	2.244
Atomic weight		63.543 (2)	63.539 (4)	63.5458 (8)	63.5456 (4)
Error		SD	SD	SD	
Annotation					

Element $_{30}$Zn Zinc

1961 65.37 1969 65.37 (3) 1971 65.38 1983 65.39 (2)

Mass no.	Nuclidic mass	48HES2	48HES2	48LEL1	49HIB2
64	63.9291454	48.89	48.90	48.89 (17)[c]	48.87 (10)
66	65.9260352	27.82	27.82	27.81 (21)[c]	27.62 (10)
67	66.9271289	4.14	4.17	4.070 (45)[c]	4.12 (9)
68	67.9248458	18.54	18.48	18.61 (16)[c]	18.71 (10)
70	69.9253249	0.617	0.623	0.620 (7)[c]	0.69 (2)
Isotope ratio	64/67	11.81	11.73	12.01 (12)	11.86
	66/67	6.72	6.67	6.83 (7)	6.70
	68/67	4.48	4.43	4.57 (5)	4.54
	70/67	0.15	0.15	0.1500 (15)	0.17
Atomic weight		65.3865 (3)	65.38156 (3)	65.387 (5)	65.393 (3)
Error		NS	NS	P	SD
Annotation					

Mass no.	Nuclidic mass	59OKA1	72ROS1	83ICA1
64	63.9291454	49.77	48.63 (13)	48.6 (3)
66	65.9260352	27.19	27.90 (8)	27.9 (2)
67	66.9271289	4.07	4.10 (3)	4.1 (1)
68	67.9248458	18.54	18.75 (16)	18.8 (4)
70	69.9253249	0.41	0.62 (1)	0.6 (1)
Isotope ratio	64/67	12.23	11.86	11.85
	66/67	6.68	6.80	6.80
	68/67	4.56	4.57	4.58
	70/67	0.10	0.15	0.15
Atomic weight		65.3598 (6)	65.396 (5)	65.40 (1)
Error		NS	2XSD	
Annotation			B	

Element $_{31}$Ga Gallium

1961 69.72 1983 69.723 (4)

Mass no.	Nuclidic mass	48ING3	48ING4	49HIB2	53ANT1
69	68.9255809	60.16 (18)[c]	60.317 (94)[c]	60.00 (7)	60.5 (2)
71	70.9247006	39.84 (18)[c]	39.683 (94)[c]	40.00 (5)	39.5 (2)
Isotope ratio	71/69	0.6622 (50)	0.6579 (26)	0.6667	0.6537 (65)
Atomic weight		69.722 (4)	69.719 (2)	69.725 (1)	69.715 (4)
Error		P	P	SD	P
Annotation					

Element $_{31}$Ga Gallium--continued

Mass no.	Nuclidic mass	72LAEl	76LAEl	83ICAl
69	68.9255809	60.093 (18)[c]	60.078 (108)[c]	60.1 (2)
71	70.9247006	39.907 (18)[c]	39.922 (108)[c]	39.9 (2)
Isotope ratio 71/69		0.6641 (5)	0.6645 (30)	0.6639
Atomic weight		69.7234 (4)	69.724 (2)	69.723 (4)
Error		NS	2XSD	
Annotation			C, B	

Element $_{32}$Ge Germanium

1961 72.59 1969 72.59 (3)

Mass no.	Nuclidic mass	47HFS1	49HIB1	49HIB1	51GRA1
70	69.9242498	20.55 (17)	20.65 (4)	20.60 (6)	20.45 (2)
72	71.9220800	27.37 (15)	27.43 (2)	27.38 (8)	27.41 (2)
73	72.9234639	7.67 (4)	7.86 (4)	7.83 (6)	7.77 (1)
74	73.9211788	36.74 (27)	36.34 (5)	36.40 (10)	36.58 (2)
76	75.9214027	7.67 (4)	7.72 (1)	7.78 (5)	7.79 (1)
Isotope ratio 70/73		2.679	2.627	2.631	2.632
72/73		3.568	3.490	3.497	3.528
74/73		4.790	4.623	4.649	4.708
76/73		1.000	0.982	0.994	1.003
Atomic weight		72.630 (6)	72.623 (1)	72.628 (3)	72.6341 (7)
Error		NS	SE	SE	SD
Annotation					

Mass no.	Nuclidic mass	51CRA1	52DIB1	53REY1	63SHI2
70	69.9242498	20.38 (2)	20.64 (20)	20.52 (17)	20.807 (34)[c]
72	71.9220800	27.37 (2)	27.50 (30)	27.43 (21)	27.591 (64)[c]
73	72.9234639	7.78 (1)	7.72 (8)	7.76 (8)	7.615 (35)[c]
74	73.9211788	36.65 (2)	36.43 (30)	36.54 (23)	36.538 (95)[c]
76	75.9214027	7.82 (1)	7.71 (8)	7.76 (8)	7.449 (38)[c]
Isotope ratio 70/73		2.619	2.674	2.644	2.732
72/73		3.518	3.562	3.535	3.623
74/73		4.711	4.719	4.709	4.798
76/73		1.005	0.999	1.000	0.978
Atomic weight		72.6382 (7)	72.624 (7)	72.631 (6)	72.611 (2)
Error		SD	P	P	SD
Annotation				B	

Element $_{32}$Ge Germanium--continued

Mass no.	Nuclidic mass	63SHI2	63SHI2	83ICA1
70	69.9242498	20.92	21.106 (12)[c]	20.5 (5)
72	71.9220800	27.58	27.670 (27)[c]	27.4 (6)
73	72.9234639	7.78	7.683 (12)[c]	7.8 (2)
74	73.9211788	36.20	36.091 (29)[c]	36.5 (7)
76	75.9214027	7.51	7.450 (11)[c]	7.8 (2)
Isotope ratio	70/73	2.689	2.747	2.63
	72/73	3.545	3.601	3.51
	74/73	4.653	4.698	4.68
	76/73	0.965	0.970	1.00
Atomic weight		72.6062 (5)	72.5968 (6)	72.63 (2)
Error		SD	SD	
Annotation				

Element $_{33}$As Arsenic

1961 74.9216

Mass no.	Nuclidic mass	63LEI1	83ICA1
75	74.9215955	100	100
Isotope ratio			
Atomic weight		74.92160 (2)	74.92160 (2)
Error		NS	
Annotation			

Element $_{34}$Se Selenium

1961 78.96 1969 78.96 (3)

Mass no.	Nuclidic mass	48WHI1	48WHI1	48WHI1	49HIB2
74	73.9224771	0.86 (13)	0.88 (1)	0.87 (1)	0.96 (3)
76	75.9192066	9.08 (9)	8.95 (3)	9.02 (7)	9.12 (3)
77	76.9199077	7.51 (75)	7.65 (3)	7.58 (7)	7.50 (14)
78	77.9173040	23.54 (24)	23.51 (11)	23.52 (2)	23.61 (5)
80	79.9165205	50.02 (50)	49.62 (14)	49.82 (20)	49.96 (21)
82	81.916709	8.99 (9)	9.39 (9)	9.19 (20)	8.84 (8)
Isotope ratio	74/78	0.037	0.037	0.037	0.041
	76/78	0.386	0.381	0.384	0.386
	77/78	0.319	0.325	0.322	0.318
	80/78	2.125	2.111	2.118	2.116
	82/78	0.382	0.399	0.391	0.374
Atomic weight		78.99 (2)	78.995 (3)	78.990 (7)	78.974 (6)
Error		SE	SE	SE	SD
Annotation			B		

Mass no.	Nuclidic mass	83ICA1
74	73.9224771	0.9 (1)
76	75.9192066	9.0 (2)
77	76.9199077	7.6 (2)
78	77.9173040	23.6 (6)
80	79.9165205	49.7 (7)
82	81.916709	9.2 (5)
Isotope ratio	74/78	0.038
	76/78	0.383
	77/78	0.323
	80/78	2.111
	82/78	0.400
Atomic weight		78.99 (2)
Error		
Annotation		

Element $_{35}$Br Bromine

1961 79.909 (2) 1965 79.904

Mass no.	Nuclidic mass	36BLE1	46WIL1	48WHI1	49HIB2
79	78.9183361	50.6 (6)	50.53 (10)[c]	50.51 (50)	50.57 (7)
81	80.916290	49.4 (6)	49.47 (10)[c]	49.49 (50)	49.43 (6)
Isotope ratio 79/81		1.026 (26)	1.021 (4)	1.021	1.023
Atomic weight		79.91 (1)	79.907 (2)	79.91 (1)	79.906 (1)
Error		NS	NS	SD	SD
Annotation					

Mass no.	Nuclidic mass	55CAM2	64CAT1	83ICA1
79	78.9183361	50.5367 (49)	50.686 (47)	50.69 (5)
81	80.916290	49.4633 (49)	49.314 (47)	49.31 (5)
Isotope ratio 79/81		1.0217 (2)	1.02784 (190)	1.028
Atomic weight		79.9066 (1)	79.9036 (9)	79.904 (1)
Error		2XSD	3XSD	
Annotation			C, B	

Element $_{36}$Kr Krypton

1961 83.80

Mass no.	Nuclidic mass	47DIB1	47LOU1	47LOU1	50NIE2
78	77.920397	0.36 (1)	0.343 (3)	0.341 (3)	0.354 (2)
80	79.916375	2.25 (2)	2.233 (9)	2.223 (2)	2.27 (1)
82	81.913483	11.57 (4)	11.510 (40)	11.490 (10)	11.56 (2)
83	82.914134	11.44 (3)	11.490 (30)	11.470 (20)	11.55 (2)
84	83.9115064	57.14 (3)	57.000 (90)	57.040 (40)	56.90 (10)
86	85.910614	17.24 (5)	17.420 (30)	17.440 (30)	17.37 (2)
Isotope ratio 78/84		0.0063	0.0060	0.0060	0.0062
80/84		0.039	0.039	0.039	0.040
82/84		0.202	0.202	0.201	0.203
83/84		0.200	0.202	0.201	0.203
86/84		0.302	0.306	0.306	0.305
Atomic weight		83.799 (2)	83.805 (1)	83.8069 (7)	83.8006 (7)
Error		SD	SE	SE	3XP
Annotation					

Element $_{36}$Kr Krypton--continued

Mass no.	Nuclidic mass	50SCH1	64CLA1	71MEL1
78	77.920397	0.353 (1)	0.353 (5)[c]	0.355 (1)
80	79.916375	2.29 (1)	2.264 (19)[c]	2.256 (7)
82	81.913483	11.58 (1)	11.590 (52)[c]	11.553 (9)
83	82.914134	11.51 (2)	11.538 (50)[c]	11.536 (9)
84	83.9115064	56.95 (4)	56.929 (60)[c]	56.982 (10)
86	85.910614	17.31 (3)	17.325 (50)[c]	17.318 (9)
Isotope ratio	78/84	0.0062	0.0062	0.0062
	80/84	0.040	0.040	0.0396
	82/84	0.203	0.204	0.2027
	83/84	0.202	0.203	0.2024
	86/84	0.304	0.304	0.3039
Atomic weight		83.7988 (8)	83.800 (2)	83.8004 (4)
Error		NS	SD	NS
Annotation				

Mass no.	Nuclidic mass	73WAL1	83ICA1
78	77.920397	0.360 (4)	0.35 (2)
80	79.916375	2.277 (4)	2.25 (2)
82	81.913483	11.58 (1)	11.6 (1)
83	82.914134	11.52 (1)	11.5 (1)
84	83.9115064	56.96 (1)	57.0 (3)
86	85.910614	17.30 (1)	17.3 (2)
Isotope ratio	78/84	0.0063	0.0061
	80/84	0.0400	0.039
	82/84	0.2033	0.203
	83/84	0.2022	0.202
	86/84	0.3037	0.304
Atomic weight		83.7985 (4)	83.800 (5)
Error		P	
Annotation		B	

Element $_{37}$Rb Rubidium

1961 85.47 1969 85.4678 (3)

Mass no.	Nuclidic mass	38BRE1	48PAU1	50NIE2	50NIE2
85	84.9117996	72.299 (77)[c]	72.53 (23)[c]	72.18 (14)[c]	72.137 (93)[c]
87	86.9091836	27.701 (77)[c]	27.47 (23)[c]	27.82 (14)[c]	27.863 (93)[c]
Isotope ratio 85/87		2.61 (1)	2.64 (3)	2.595 (6)	2.589 (4)
Atomic weight		85.465 (2)	85.460 (5)	85.467 (3)	85.468 (2)
Error		NS	3XSD	P	P
Annotation					

Mass no.	Nuclidic mass	53HER1	56PAC1	60OMU1	63SHI1
85	84.9117996	72.153 (23)[c]	72.603 (75)	72.1 (1)[c]	72.218 (12)[c]
87	86.9091836	27.847 (23)[c]	27.397 (75)	27.9 (1)[c]	27.782 (12)[c]
Isotope ratio 85/87		2.591 (3)	2.65 (1)	2.58 (1)	2.5995 (15)
Atomic weight		85.4680 (5)	85.459 (1)	85.469 (2)	85.4667 (2)
Error		NS	NS	NS	3XSD
Annotation					

Mass no.	Nuclidic mass	63SHI1	63SHI1	69CAT1	83ICA1
85	84.9117996	72.243 (38)[c]	72.183 (38)[c]	72.1654 (132)	72.165 (13)
87	86.9091836	27.757 (38)[c]	27.817 (38)[c]	27.8346 (132)	27.835 (13)
Isotope ratio 85/87		2.6027 (49)	2.5949 (49)	2.59265 (170)	2.5926
Atomic weight		85.4662 (8)	85.4674 (8)	85.4678 (3)	85.4678 (3)
Error		SD	SD	3XSD	
Annotation				C, B	

Element $_{38}$Sr Strontium

1961 87.62

Mass no.	Nuclidic mass	38NIE1	48WHI1	53ALD1	54HER1
84	83.913428	0.561 (11)[c]	0.55 (8)	0.553 (41)	0.471 (58)
86	85.9092732	9.858 (90)[c]	9.75 (10)	9.866 (23)	9.892 (53)
87	86.9088902	7.018 (66)[c]	6.96 (7)	7.018 (31)	6.923 (54)
88	87.9056249	82.56 (10)[c]	82.74 (83)	82.563 (48)	82.713 (83)
Isotope ratio	84/86	0.057	0.056	0.056	0.048
	87/86	0.712	0.714	0.711	0.700
	88/86	8.375	8.486	8.368	8.362
Atomic weight		87.617 (2)	87.620 (4)	87.617 (2)	87.620 (2)
Error		P	P	SE	SD
Annotation					

Mass no.	Nuclidic mass	54HER1	54HER1	54HER1	54HER1
84	83.913428	0.55	0.56	0.5608 (82)	0.55
86	85.9092732	9.76	9.81	9.946 (23)	9.91
87	86.9088902	6.94	6.94	7.019 (31)	7.01
88	87.9056249	82.75	82.69	82.472 (35)	82.52
Isotope ratio	84/86	0.056	0.057	0.0564	0.055
	87/86	0.711	0.707	0.7057	0.707
	88/86	8.478	8.429	8.292	8.327
Atomic weight		87.6197 (4)	87.6183 (4)	87.6147 (6)	87.6160 (4)
Error		SD	SD	SD	SD
Annotation					

Mass no.	Nuclidic mass	54HER1	56AKI1	58PIN1	58PIN1
84	83.913428	0.57	0.58 (6)	0.561 (16)	0.561 (16)
86	85.9092732	9.87	9.99 (2)	9.872 (23)	9.850 (23)
87	86.9088902	7.01	7.14 (25)	7.029 (25)	7.023 (25)
88	87.9056249	82.56	82.29 (62)	82.538 (33)	82.565 (33)
Isotope ratio	84/86	0.058	0.058	0.0568	0.0570
	87/86	0.710	0.715	0.712	0.713
	88/86	8.365	8.237	8.361	8.382
Atomic weight		87.6159 (4)	87.612 (3)	87.6161 (7)	87.6166 (7)
Error		SD	NS	SD	SD
Annotation					

Element $_{38}$Sr Strontium--continued

Mass no.	Nuclidic mass	58PIN1	60OMU1	82MOO1	83ICA1
84	83.913428	0.56	0.60 (1)	0.55738 (155)	0.56 (1)
86	85.9092732	9.87	9.75 (1)	9.85659 (337)	9.86 (1)
87	86.9088902	7.01	7.07 (1)	7.00152 (263)	7.00 (1)
88	87.9056249	82.56	82.58 (3)	82.58451 (657)	82.58 (1)
Isotope ratio	84/86	0.057	0.0061	0.056549 (143)	0.0568
	87/86	0.7012	0.7241	0.710339 (261)	0.7099
	88/86	8.365	8.470	8.378612 (3248)	8.375
Atomic weight		87.6164 (4)	87.6166 (4)	87.616814 (117)	87.6167 (4)
Error		SD	NS	3XSD	
Annotation				C, B	

Element $_{39}$Y Yttrium

1961 88.905 1969 88.9059

Mass no.	Nuclidic mass	56HES1	57COL1	83ICA1
89	88.9058560	100	100	100
Isotope ratio				
Atomic weight		88.90586 (2)	88.90586 (2)	88.90586 (2)
Error		NS	NS	
Annotation				

Element $_{40}$Zr Zirconium

1961 91.22 1983 91.224 (2)

Mass no.	Nuclidic mass	48WHI1	49HIN1	58DRA1	63MUR1
90	89.9047080	51.46 (51)	51.7	51.12 (11)	51.50 (17)[c]
91	90.9056442	11.23 (11)	10.8	11.22 (5)	11.223 (71)[c]
92	91.9050392	17.11 (17)	17.1	17.40 (4)	17.10 (10)[c]
94	93.9063191	17.40 (17)	17.5	17.57 (4)	17.38 (10)[c]
96	95.908272	2.80 (3)	2.9	2.79 (10)	2.799 (19)[c]
Isotope ratio	90/92	3.008	3.023	2.938	3.011
	91/92	0.656	0.632	0.645	0.656
	94/92	1.017	1.023	1.010	1.016
	96/92	0.164	0.170	0.160	0.164
Atomic weight		91.224 (8)	91.229 (6)	91.326 (5)	91.222 (4)
Error		SD	NS	SD	2XSD
Annotation					

Element $_{40}$Zr Zirconium--continued

Mass no.	Nuclidic mass	78SHI2	81MIN1	83NOM1	83ICA1
90	89.9047080	51.449 (59)	51.444 $^{+0.085}_{-0.025}$	51.452 (9)[c]	51.45 (2)
91	90.9056442	11.320 (15)	11.214 $^{+0.008}_{-0.004}$	11.223 (12)[c]	11.22 (2)
92	91.9050392	17.189 (21)	17.150 $^{+0.008}_{-0.017}$	17.146 (7)[c]	17.15 (1)
94	93.9063191	17.283 (21)	17.393 $^{+0.016}_{-0.057}$	17.380 (12)[c]	17.38 (2)
96	95.908272	2.759 (4)	2.798 $^{+0.008}_{-0.019}$	2.799 (5)[c]	2.80 (1)
Isotope ratio	90/92	2.993	3.000	3.0008 (12)	2.9965
	91/92	0.659	0.654	0.6546 (7)	0.6564
	94/92	1.005	1.014	1.0137 (12)	1.0093
	96/92	0.161	0.163	0.1632 (8)	0.1619
Atomic weight		91.219 (1)	91.224 (2)	91.2235 (4)	91.221 (6)
Error		SD	P	2XSD	
Annotation			C	C, B	

Element $_{41}$Nb Niobium

1961 92.906 1969 92.9064

Mass no.	Nuclidic mass	56WHI1	83ICA1
93	92.9063780	100	100
Isotope ratio			
Atomic weight		92.90638 (2)	92.90638 (2)
Error		NS	
Annotation			

Element $_{42}$Mo Molybdenum

1961 95.94 1969 95.94 (3) 1975 95.94

Mass no.	Nuclidic mass	39MAT1	40VAL1	46WIL1	46WIL1
92	91.906809	15.51 (14)	14.9 (2)	15.83 (16)	15.84 (16)
94	93.9050862	8.69 (12)	9.40 (9)	9.102 (91)	8.972 (90)
95	94.9058379	16.27 (12)	16.1 (2)	15.76 (16)	15.68 (16)
96	95.9046755	16.83 (12)	16.6 (2)	16.54 (16)	16.51 (17)
97	96.9060179	8.73 (12)	9.65 (10)	9.481 (94)	9.473 (95)
98	97.9054050	25.423 (82)	24.1 (2)	23.70 (24)	23.86 (24)
100	99.907473	8.54 (12)	9.25 (10)	9.576 (91)	9.664 (97)
Isotope ratio	92/96	0.922	0.898	0.957	0.959
	94/96	0.516	0.566	0.550	0.543
	95/96	0.967	0.970	0.953	0.950
	97/96	0.519	0.581	0.573	0.574
	98/96	1.511	1.452	1.433	1.446
	100/96	0.507	0.557	0.579	0.585
Atomic weight		95.887 (8)	95.91 (1)	95.885 (9)	95.894 (9)
Error		NS	P	P	P
Annotation					

Mass no.	Nuclidic Mass	49HIB2	600MU1	63MUR1	64CRO1	64WET1
92	91.906809	15.05 (1)	15.75 (20)	14.779 (81)	14.739 (27)	14.826 (48)[c]
94	93.9050862	9.35 (1)	9.21 (9)	9.184 (56)	9.107 (43)	9.243 (32)[c]
95	94.9058379	15.78 (4)	15.91 (7)	15.931 (88)	15.918 (43)	15.908 (48)[c]
96	95.9046755	16.56 (4)	16.38 (11)	16.699 (88)	16.713 (61)	16.720 (48)[c]
97	96.9060179	9.60 (1)	9.44 (2)	9.530 (57)	9.476 (63)	9.561 (32)[c]
98	97.9054050	24.00 (3)	23.67 (6)	24.28 (12)	24.421 (99)	24.165 (79)[c]
100	99.907473	9.68 (1)	9.56 (5)	9.597 (57)	9.625 (71)	9.577 (32)[c]
Isotope ratio	92/96	0.909	0.961	0.885	0.882	0.887
	94/96	0.565	0.562	0.550	0.545	0.553
	95/96	0.953	0.971	0.954	0.952	0.951
	97/96	0.580	0.576	0.571	0.567	0.572
	98/96	1.449	1.445	1.454	1.461	1.445
	100/96	0.585	0.584	0.575	0.576	0.573
Atomic weight		95.9118 (9)	95.883 (8)	95.936 (5)	95.943 (4)	95.931 (3)
Error		SD	SD	2XSD	SD	SE
Annotation						

Element $_{42}$Mo Molybdenum--continued

Mass no.	Nuclidic mass	72STE1	74MOO1	75TAM1	81MIN1	83ICA1
92	91.906809	14.83	14.8362 (148)	14.827 (12)[c]	14.83 (3)[c]	14.84 (4)
94	93.9050862	9.25	9.2466 (92)	9.239 (17)[c]	9.27 (5)[c]	9.25 (2)
95	94.9058379	15.92	15.9201 (159)	15.922 (22)[c]	15.90 (3)[c]	15.92 (4)
96	95.9046755	16.67	16.6756 (167)	16.683 (22)[c]	16.67 (3)[c]	16.68 (4)
97	96.9060179	9.55	9.5551 (96)	9.557 (15)[c]	9.53 (2)[c]	9.55 (2)
98	97.9054050	24.14	24.1329 (241)	24.143 (43)[c]	24.13 (5)[c]	24.13 (6)
100	99.907473	9.63	9.6335 (96)	9.629 (8)[c]	9.63 (2)[c]	9.63 (2)
Isotope ratio	92/96	0.890	0.8897	0.8888 (8)	0.8900 (18)	0.890
	94/96	0.555	0.5543	0.5538 (10)	0.5561 (38)	0.555
	95/96	0.955	0.9545	0.9544 (13)	0.9538 (24)	0.954
	97/96	0.573	0.5730	0.5729 (9)	0.5740 (19)	0.573
	98/96	1.448	1.4472	1.4472 (26)	0.4486 (44)	1.447
	100/96	0.578	0.5775	0.5772 (5)	0.5779 (11)	0.577
Atomic weight		95.9319 (6)	95.9318 (9)	95.932 (1)	95.932 (2)	95.931 (2)
Error		2XSD	2XSD	SD	NS	
Annotation			B			

Element $_{44}$Ru Ruthenium

1961 101.07 1969 101.07 (3) 1983 101.07 (2)

Mass no.	Nuclidic mass	44EWA1	53FRI1	54BAL1	56WHI1
96	95.907596	5.68 (17)	5.50	5.47 (3)	5.57 (8)
98	97.905287	2.22 (9)	1.91	1.84 (2)	1.86 (4)
99	98.9059371	12.81 (19)	12.70	12.77 (5)	12.7 (1)
100	99.9042175	12.70 (19)	12.69	12.56 (5)	12.6 (1)
101	100.9055808	16.98 (25)	17.01	17.10 (6)	17.1 (1)
102	101.9043475	31.34 (47)	31.52	31.70 (6)	31.6 (2)
104	103.905422	18.27 (27)	18.67	18.56 (5)	18.5 (1)
Isotope ratio	96/100	0.447	0.443	0.436	0.442
	98/100	0.175	0.150	0.146	0.148
	99/100	1.009	1.001	1.017	1.008
	101/100	1.337	1.340	1.361	1.357
	102/100	2.468	2.484	2.524	2.508
	104/100	1.439	1.471	1.478	1.468
Atomic weight		101.03 (1)	101.0672 (7)	101.069 (3)	101.062 (6)
Error		P	NS	NS	NS
Annotation					

Element $_{44}$Ru Ruthenium--continued

Mass no.	Nuclidic mass	70TAK1	76DEV1	83ICA1
96	95.907596	5.52	5.52 (1)	5.52 (5)
98	97.905287	1.87	1.86 (1)	1.88 (5)
99	98.9059371	12.67	12.74 (2)	12.7 (1)
100	99.9042175	12.60	12.60 (2)	12.6 (1)
101	100.9055808	17.09	17.05 (1)	17.0 (1)
102	101.9043475	31.55	31.57 (3)	31.6 (2)
104	103.905422	18.71	18.66 (3)	18.7 (2)
Isotope ratio	96/100	0.438	0.438	0.438
	98/100	0.148	0.148	0.149
	99/100	1.006	1.011	1.008
	101/100	1.356	1.353	1.349
	102/100	2.503	2.506	2.508
	104/100	1.485	1.481	1.484
Atomic weight		101.0805 (7)	101.068 (1)	101.070 (7)
Error		NS	SD	
Annotation			B	

Element $_{45}$Rh Rhodium

1961 102.905 1967 102.9055

Mass no.	Nuclidic mass	63LEI1	83ICA1
103	102.905503	100	100
Isotope ratio			
Atomic weight		102.90550 (2)	102.90550 (2)
Error		NS	
Annotation			

Element $_{46}$Pd Palladium

1961 106.4 1979 106.42

Mass no.	Nuclidic mass	53SITT	78KELT	78SHIT	81MERT	83ICAT
102	101.905609	0.96	1.013 (1)[C]	1.020 (8)	1.040 (2)[C]	1.020 (12)
104	103.904026	10.97	11.089 (2)[C]	11.14 (5)	11.261 (8)[C]	11.14 (8)
105	104.905075	22.23	22.317 (3)[C]	22.33 (5)	22.518 (16)[C]	22.33 (8)
106	105.903475	27.33	27.288 (5)[C]	27.33 (2)	27.374 (14)[C]	27.33 (5)
108	107.903894	26.71	26.534 (6)[C]	26.46 (6)	26.292 (14)[C]	26.46 (9)
110	109.905169	11.81	11.759 (2)[C]	11.72 (6)	11.515 (8)[C]	11.72 (9)
Isotope ratio	102/104	0.0875	0.09132 (5)	0.0916	0.092381 (82)	0.0916
	105/104	2.0264	2.01245 (29)	2.0045	1.99967 (30)	2.0045
	106/104	2.4913	2.46077 (46)	2.4533	2.43085 (61)	2.4533
	108/104	2.4348	2.39279 (57)	2.3752	2.58997 (53)	2.3752
	110/104	1.0766	1.06040	1.0521	1.02255 (29)	1.0521
Atomic weight		106.4307 (7)	106.4198 (1)	106.415 (3)	106.3987 (5)	106.415 (4)
Error		NS	2XSE	2XSD	2XSE	
Annotation				C, B		

Element $_{47}$Ag Silver

1961 107.870 (3) 1965 107.868 1981 107.8682 (3)

Mass no.	Nuclidic mass	48PAUT	48WHIT	57HEST	57HEST
107	106.905095	51.92 (14)[C]	51.35 (7)	51.99 (46)[C]	51.90 (35)[C]
109	108.904754	48.08 (14)[C]	48.65 (7)	48.01 (46)[C]	48.10 (35)[C]
Isotope ratio 107/109		1.080 (6)	1.055	1.083 (20)	1.079 (15)
Atomic weight		107.867 (3)	107.878 (1)	107.865 (9)	107.867 (7)
Error		3XSD	SE	SE	SE
Annotation					

Mass no.	Nuclidic mass	57HEST	59CROT	59CROT	60MURT
107	106.905095	52.02 (35)[C]	52.015 (46)[C]	52.036 (16)[C]	51.830 (46)[C]
109	108.904754	47.98 (35)[C]	47.985 (46)[C]	47.964 (16)[C]	48.170 (46)[C]
Isotope ratio 107/109		1.084 (15)	1.084 (2)	1.0849 (7)	1.076 (2)
Atomic weight		107.865 (7)	107.8646 (9)	107.8642 (3)	107.8683 (9)
Error		NS	SD	SD	P
Annotation					

Element $_{47}$Ag Silver--continued

Mass no.	Nuclidic mass	60MUR1	60SHI1	62CRO1	62MUR1
107	106.905095	51.737 (46)[C]	51.818 (30)[C]	51.77 (10)[C]	51.597 (46)[C]
109	108.904754	48.263 (46)[C]	48.182 (30)[C]	48.23 (10)[C]	48.403 (46)[C]
Isotope ratio 107/109		1.072 (2)	1.07547 (130)	1.0733 (43)	1.066 (2)
Atomic weight		107.8702 (9)	107.8686 (6)	107.870 (2)	107.8730 (9)
Error		P	3XSD	3XSD	SD
Annotation			C	C	

Mass no.	Nuclidic mass	62MUR1	62MUR1	62SHI1	81MUR1
107	106.905095	51.503 (49)[C]	51.527 (49)[C]	51.830 (26)[C]	52.07 (2)
109	108.904754	48.496 (49)[C]	48.473 (49)[C]	48.170 (26)[C]	47.93 (2)
Isotope ratio 107/109		1.062 (2)	1.063 (2)	1.07597 (135)	1.0864
Atomic weight		107.87 (1)	107.874 (1)	107.8683 (5)	107.8635 (4)
Error		SD	SD	3XSD	NS
Annotation					

Mass no.	Nuclidic mass	82POW1	83CHE1	83ICA1
107	106.905095	51.839170 (5057)	51.948 (9)[C]	51.839 (5)
109	108.904754	48.160830 (5057)	48.052 (9)[C]	48.161 (5)
Isotope ratio 107/109		1.07638 (135)	1.0811 (17)	1.07637
Atomic weight		107.8681 (1)	107.8660 (2)	107.8682 (1)
Error		3XSD	2XSD	
Annotation		C, B		

Element $_{48}$Cd Cadmium

1961 112.40 1975 112.41

Mass no.	Nuclidic mass	48EWA1	48LEL1	48WHI1	49HIB2
106	105.906461	1.2	1.215 (12)[c]	1.22 (1)	1.22 (1)
108	107.904186	0.7	0.875 (10)[c]	0.98 (1)	0.89 (2)
110	109.903007	12.8	12.39 (12)[c]	12.35 (4)	12.43 (4)
111	110.904182	13.0	12.75 (12)[c]	12.78 (4)	12.86 (4)
112	111.9027614	24.2	24.07 (19)[c]	24.00 (10)	23.79 (6)
113	112.9044013	12.2	12.26 (12)[c]	12.30 (4)	12.34 (5)
114	113.9033607	28.9	28.86 (10)[c]	28.75 (20)	28.81 (7)
116	115.904758	7.0	7.58 (3)[c]	7.63 (4)	7.66 (3)
Isotope ratio	106/112	0.050	0.0505 (5)	0.0508	0.0513
	108/112	0.029	0.0364 (4)	0.0408	0.0374
	110/112	0.529	0.5147 (51)	0.5146	0.5225
	111/112	0.537	0.5297 (53)	0.5325	0.5406
	113/112	0.504	0.5093 (51)	0.5125	0.5187
	114/112	1.194	1.1990 (120)	1.1979	1.2110
	116/112	0.289	0.3182 (32)	0.3179	0.3220
Atomic weight		112.398 (9)	112.423 (4)	112.420 (4)	112.424 (2)
Error		NS	P	P	SD
Annotation					

Mass no.	Nuclidic mass	58PAL1	75ROS1	78MUR1	80ROS1	83ICA1
106	105.906461	1.240 (15)	1.25 (1)	1.27 (2)	1.25 (2)	1.25 (3)
108	107.904186	0.871 (9)	0.894 (6)	0.90 (2)	0.89 (1)	0.89 (1)
110	109.903007	12.32 (7)	12.51 (5)	12.48 (15)	12.49 (6)	12.49 (9)
111	110.904182	12.67 (7)	12.81 (4)	12.85 (15)	12.80 (4)	12.80 (6)
112	111.9027614	24.15 (12)	24.13 (7)	24.07 (8)	24.13 (7)	24.13 (11)
113	112.9044013	12.21 (3)	12.22 (4)	12.26 (7)	12.22 (4)	12.22 (6)
114	113.9033607	28.93 (20)	28.71 (10)	28.70 (8)	28.73 (21)	28.73 (21)
116	115.904758	7.61 (8)	7.47 (5)	7.47 (8)	7.49 (6)	7.49 (9)
Isotope ratio	106/112	0.0513	0.0518	0.0528	0.0518	0.0518
	108/112	0.0361	0.0370	0.0372	0.0369	0.0369
	110/112	0.5101	0.5184	0.5186	0.5176	0.5176
	111/112	0.5246	0.5309	0.5342	0.5305	0.5305
	113/112	0.5056	0.5064	0.5093	0.5305	0.5064
	114/112	1.1979	1.1898	1.1926	0.5064	1.1906
	116/112	0.3151	0.3096	0.3106	1.1906	0.3104
Atomic Weight		112.426 (5)	112.410 (4)	112.408 (6)	112.412 (4)	112.412 (5)
Error		SD	2XSD	NS		
Annotation			C		B	

Element $_{49}$In Indium

1961 114.82

Mass no.	Nuclidic mass	48WHI1	49HIB2	56WHI1	83ICA1
113	112.904056	4.23 (3)	4.16 (1)	4.33 (4)	4.3 (2)
115	114.903875	95.77 (3)	95.84 (1)	95.67 (4)	95.7 (2)
Isotope ratio 113/115		0.04417	0.04341	0.04526	0.04493
Atomic weight		114.8193 (6)	114.8207 (2)	114.8173 (8)	114.818 (4)
Error		SE	SD	NS	
Annotation				B	

Element $_{50}$Sn Tin

1961 118.69 1969 118.69 (3) 1983 118.710 (7)

Mass no.	Nuclidic mass	48HIN1	48WHI1	49HIB2
112	111.904823	0.94 (2)	0.900 (3)	1.01 (3)
114	113.902781	0.65 (3)	0.61 (1)	0.68 (1)
115	114.9033441	0.33 (2)	0.350 (6)	0.35 (3)
116	115.9017435	14.36 (4)	14.07 (8)	14.28 (1)
117	116.9029536	7.51 (4)	7.54 (3)	7.67 (5)
118	117.9016066	24.21 (7)	23.98 (3)	23.84 (8)
119	118.9033102	8.45 (4)	8.620 (3)	8.68 (1)
120	119.9021990	33.11 (10)	33.03 (12)	32.75 (3)
122	121.903440	4.61 (5)	4.78 (1)	4.74 (4)
124	123.905271	5.83 (5)	6.110 (6)	6.01 (9)
Isotope ratio	112/120	0.0284	0.0272	0.0308
	114/120	0.0196	0.0185	0.0208
	115/120	0.0100	0.0106	0.0107
	116/120	0.4337	0.4260	0.4360
	117/120	0.2268	0.2283	0.2342
	118/120	0.7312	0.7260	0.7278
	119/120	0.2552	0.2610	0.2650
	122/120	0.1392	0.1447	0.1447
	124/120	0.1761	0.1850	0.1835
Atomic weight		118.729 (4)	118.762 (3)	118.746 (6)
Error		P	SE	SD
Annotation				

Element $_{50}$Sn Tin--continued

Mass no.	Nuclidic Mass	52DIBI	65LAEI	83DEVI	83ICAI
112	111.904823	0.99 (5)	1.01 (3)	0.973 (3)	0.97 (1)
114	113.902781	0.68 (3)	0.67 (3)	0.652 (3)	0.65 (1)
115	114.9033441	0.36 (3)	0.38 (3)	0.359 (3)	0.36 (1)
116	115.9017435	14.49 (10)	14.76 (5)	14.532 (36)	14.53 (11)
117	116.9029536	7.71 (8)	7.75 (3)	7.675 (23)	7.68 (7)
118	117.9016066	24.09 (20)	24.30 (8)	24.218 (36)	24.22 (11)
119	118.9033102	8.59 (8)	8.55 (3)	8.583 (13)	8.58 (4)
120	119.9021990	32.52 (30)	32.38 (8)	32.590 (33)	32.59 (10)
122	121.903440	4.77 (5)	4.56 (3)	4.629 (9)	4.63 (3)
124	123.905271	5.81 (6)	5.64 (3)	5.789 (18)	5.79 (5)
Isotope ratio	112/120	0.0304	0.0312	0.02984	0.0298
	114/120	0.0209	0.0207	0.0200	0.0199
	115/120	0.0111	0.0116	0.0110	0.0111
	116/120	0.4456	0.4558	0.4459	0.4458
	117/120	0.2371	0.2392	0.2355	0.2357
	118/120	0.7408	0.7504	0.7432	0.7432
	119/120	0.2641	0.2642	0.2634	0.2633
	122/120	0.1467	0.1408	0.1420	0.1421
	124/120	0.1787	0.1742	0.1776	0.1777
Atomic weight		118.726 (7)	118.685 (4)	118.710 (7)	118.710 (5)
Error		P	SD	3XSD	
Annotation				B	

Element $_{51}$Sb Antimony

1961 121.75 1969 121.75 (3)

Mass no.	Nuclidic mass	48WHI1	83ICA1
121	120.9038237	57.25 (57)	57.3 (9)
123	122.904222	42.75 (57)	42.7 (9)
Isotope ratio	121/123	1.339	
Atomic weight		121.76 (1)	121.76 (2)
Error		P	
Annotation		B	

Element $_{52}$Te Tellurium

1961 127.60 1969 127.60 (3)

Mass no.	Nuclidic mass	46WIL1	48WHI1	48WHI1	49HIB2
120	119.904021	0.090 (6)[C]	0.091 (1)	0.092	0.090 (10)
122	121.903055	2.43 (6)[C]	2.49 (2)	2.32	2.47 (1)
123	122.904278	0.85 (2)[C]	0.89 (2)	0.88	0.89 (1)
124	123.902825	4.59 (13)[C]	4.63 (5)	4.51	4.74 (2)
125	124.904435	6.98 (7)[C]	7.01 (1)	6.99	7.03 (3)
126	125.903310	18.70 (7)[C]	18.72 (4)	18.53	18.72 (5)
128	127.904464	31.85 (9)[C]	31.72 (1)	32.57	31.75 (6)
130	129.906229	34.51 (7)[C]	34.46 (9)	34.11	34.27 (5)
Isotope ratio	120/130	0.00256 (17)	0.0026	0.0027	0.0026
	122/130	0.0705 (18)	0.0722	0.0680	0.0721
	123/130	0.0247 (5)	0.0230	0.0258	0.0260
	124/130	0.133 (4)	0.134	0.132	0.138
	125/130	0.202 (2)	0.203	0.205	0.205
	126/130	0.542 (2)	0.543	0.543	0.546
	128/130	0.923 (3)	0.920	0.955	0.926
Atomic weight		127.632 (7)	127.623 (3)	127.6356 (9)	127.615 (2)
Error		NS	SE	NS	SD
Annotation					

Mass no.	Nuclidic mass	78SMI1	83ICA1
120	119.904021	0.0960 (7)[C]	0.096 (2)
122	121.903055	2.603 (3)[C]	2.60 (1)
123	122.904278	0.908 (1)[C]	0.908 (3)
124	123.902825	4.816 (3)[C]	4.816 (8)
125	124.904435	7.139 (3)[C]	7.14 (1)
126	125.903310	18.952 (5)[C]	18.95 (1)
128	127.904464	31.687 (7)[C]	31.69 (2)
130	129.906229	33.799 (7)[C]	33.80 (2)
Isotope ratio	120/130	0.00284 (2)	0.0028
	122/130	0.07701 (4)	0.0769
	123/130	0.02687 (2)	0.0269
	124/130	0.14250 (6)	0.142
	125/130	0.21122 (6)	0.211
	126/130	0.56078	0.561
	128/130	0.93753 (16)	0.937
Atomic weight		127.5856 (3)	127.5858 (9)
Error		2XSD	
Annotation		B	

Element $_{53}$I Iodine

1961 126.9044 1969 126.9045

Mass no.	Nuclidic mass	49LEL1	83ICA1
127	126.904477	100	100
Isotope ratio			
Atomic weight		126.90448 (3)	126.90448 (3)
Error		NS	
Annotation			

Element $_{54}$Xe Xenon

1961 131.30 1979 131.29 (3)

Mass no.	Nuclidic mass	47DIB1	47LOU1	50NIE2	71POD1
124	123.90612	0.102 (9)	0.095 (1)	0.096 (1)	0.0949 (5)[c]
126	125.904281	0.098 (3)	0.088 (1)	0.090 (1)	0.0884 (5)[c]
128	127.9035308	1.93 (1)	1.917 (6)	1.919 (4)	1.914 (5)[c]
129	128.9047801	26.51 (2)	26.240 (80)	26.44 (8)	26.431 (21)[c]
130	129.9035095	3.68 (4)	4.053 (5)	4.08 (1)	4.064 (8)[c]
131	130.905076	21.04 (9)	21.240 (30)	21.18 (5)	21.229 (21)[c]
132	131.904148	27.12 (7)	26.930 (20)	26.89 (7)	26.879 (21)[c]
134	133.905395	10.54 (5)	10.520 (20)	10.44 (2)	10.432 (21)[c]
136	135.907219	8.98 (3)	8.930 (30)	8.87 (1)	8.868 (16)[c]
Isotope ratio	124/130	0.0277	0.0234	0.0236	0.02335 (14)
	126/130	0.0266	0.0217	0.0220	0.02176 (14)
	128/130	0.5245	0.4730	0.4709	0.4708 (17)
	129/130	7.204	6.474	6.488	6.505 (15)
	131/130	5.717	5.241	5.198	5.224 (12)
	132/130	7.370	6.644	6.599	6.614 (12)
	134/130	2.864	2.596	2.562	2.567 (7)
	136/130	2.440	2.203	2.176	2.182 (6)
Atomic weight		131.304 (2)	131.302 (2)	131.292 (2)	131.293 (1)
Error		SD	SE	P	2XSD
Annotation				B	

Element $_{54}$Xe Xenon--continued

Mass no.	Nuclidic mass	83ICA1
124	123.90612	0.10 (1)
126	125.904281	0.09 (1)
128	127.9035308	1.91 (3)
129	128.9047801	26.4 (6)
130	129.9035095	4.1 (1)
131	130.905076	21.2 (4)
132	131.904148	26.9 (5)
134	133.905395	10.4 (2)
136	135.907219	8.9 (1)
Isotope ratio	124/130	0.0244
	126/130	0.0220
	128/130	0.4659
	129/130	6.439
	131/130	5.171
	132/130	6.561
	134/130	2.537
	136/130	2.171
Atomic weight		131.29 (2)
Error		
Annotation		

Element $_{55}$Cs Caesium

1961 132.905 1969 132.9055 1971 132.9054

Mass no.	Nuclidic mass	56WHI1	83ICA1
133	132.905433	100	100
Isotope ratio			
Atomic weight		132.90543 (5)	132.90543 (5)
Error		NS	
Annotation			

Element $_{56}$Ba Barium

1961 137.34 1969 137.34 (3) 1975 134.33

Mass no.	Nuclidic mass	38NIE1	49HER1	56AKI1	60OMU1	62RID1
130	129.906277	0.1010 (43)[c]	0.103 (4)	0.13 (2)	0.109 (50)	0.098 (2)
132	131.905042	0.0975 (43)[c]	0.096 (4)	0.19 (2)	0.103 (30)	0.091 (3)
134	133.904490	2.415 (49)[c]	2.39 (5)	2.60 (5)	2.45 (5)	2.33 (2)
135	134.905668	6.59 (13)[c]	6.56 (12)	6.73 (12)	6.72 (19)	6.42 (3)
136	135.904556	7.81 (13)[c]	7.79 (10)	8.07 (10)	8.06 (13)	7.77 (2)
137	136.905816	11.32 (19)[c]	11.25 (10)	11.87 (25)	11.41 (10)	11.18 (5)
138	137.905236	71.66 (21)[c]	71.83 (29)	70.41 (35)	71.12 (13)	72.11 (6)
Isotope ratio	130/138	0.00141 (6)	0.001434	0.00185	0.00153	0.001359
	132/138	0.00136 (6)	0.001336	0.0270	0.00145	0.001262
	134/138	0.0337 (6)	0.03327	0.03693	0.03445	0.03231
	135/138	0.092 (2)	0.0913	0.0956	0.09449	0.08903
	136/138	0.109 (2)	0.1085	0.1146	0.11333	0.10775
	137/138	0.158 (3)	0.1566	0.1686	0.16043	0.15504
Atomic weight		137.328 (4)	137.317 (4)	137.297 (5)	137.315 (7)	137.341 (1)
Error		P	2XSD	P	NS	SD
Annotation						

Mass no.	Nuclidic mass	62UME1	69EUG1	73LAE1	76CHO1
130	129.906277	0.1022 (1)[c]	0.1058 (2)	0.1054 (4)[c]	0.10
132	131.905042	0.0986 (1)[c]	0.1012 (2)	0.1013 (4)[c]	0.10
134	133.904490	2.388 (2)[c]	2.417 (3)	2.411 (2)[c]	2.42
135	134.905668	6.531 (6)[c]	6.592 (2)	6.593 (6)[c]	6.59
136	135.904556	7.817 (6)[c]	7.853 (4)	7.863 (6)[c]	7.81
137	136.905816	11.134 (7)[c]	11.232 (4)	11.248 (9)[c]	11.32
138	137.905236	71.929 (23)[c]	71.699 (7)	71.678 (23)[c]	71.66
Isotope ratio	130/138	0.0014215 (20)	0.001473	0.001471 (6)	0.00140
	132/138	0.0013712 (17)	0.001412	0.001413 (6)	0.00140
	134/138	0.033197 (34)	0.03371	0.03363 (3)	0.0338
	135/138	0.09080 (8)	0.09194	0.09198 (9)	0.0920
	136/138	0.10868 (9)	0.10952	0.10970 (9)	0.1090
	137/138	0.15479 (10)	0.15665	0.15693 (10)	0.1580
Atomic weight		137.3321 (2)	137.3269 (1)	137.3268 (2)	137.327 (1)
Error		2XSD	SE	3XSD	NS
Annotation			C, B		

Element $_{56}$Ba Barium--continued

Mass no.	Nuclidic mass	83ICA1
130	129.906277	0.106 (2)
132	131.905042	0.101 (2)
134	133.904490	2.417 (27)
135	134.905668	6.592 (18)
136	135.904556	7.854 (39)
137	136.905816	11.23 (1)
138	137.905236	71.70 (7)
Isotope ratio	130/138	0.001478
	132/138	0.001409
	134/138	0.03371
	135/138	0.09194
	136/138	0.10954
	137/138	0.15663
Atomic weight		137.327 (1)
Error		
Annotation		

Element $_{57}$La Lanthanum

1961 138.91 1969 138.9055 (3)

Mass no.	Nuclidic mass	47ING2	56WHI1	72MAS1	75YAN1	83ICA1
138	137.907114	0.089 (2)	0.0885 (16)	0.089 (2)[c]	0.089 (2)[c]	0.09 (2)
139	138.906355	99.911 (2)	99.9115 (16)	99.911 (2)[c]	99.911 (2)[c]	99.91 (2)
Isotope ratio 138/139		0.000891	0.000893 (16)	.0008873 (24)	.000890 (7)	0.000891
Atomic weight		138.90547 (2)	138.90547 (2)	138.90547 (2)	138.90547 (2)	138.9055 (2)
Error		SE	NS	2XSD	2XSD	
Annotation		B				

Element $_{58}$Ce Cerium

1961 140.12

Mass no.	Nuclidic mass	47ING2	49HIB2	62UME1	83ICA1
136	135.90714	0.193 (5)	0.195 (5)	0.1904 (3)[c]	0.19 (1)
138	137.905996	0.250 (5)	0.265 (5)	0.2536 (4)[c]	0.25 (1)
140	139.905442	88.48 (10)	88.449 (20)	88.475 (8)[c]	88.48 (10)
142	141.909249	11.07 (10)	11.098 (33)	11.081 (7)[c]	11.08 (10)
Isotope ratio	136/140	0.002181	0.002205	0.0021526 (29)	0.002147
	138/140	0.002825	0.002996	0.0028663 (41)	0.002825
	142/140	0.1251	0.12547	0.12525 (8)	0.1252
Atomic weight		140.115 (2)	140.1147 (6)	140.1148 (1)	140.115 (2)
Error		SE	SD	2XSD	
Annotation				B	

Element $_{59}$Pr Praseodymium

1961 140.907 1969 140.9077

Mass no.	Nuclidic mass	57COL1	83ICA1
141	140.907657	100	100
Isotope ratio			
Atomic weight		140.90766 (3)	140.90766 (3)
Error		NS	
Annotation			

Element $_{60}$Nd Neodymium

1961 144.24 1969 144.24 (3)

Mass no.	Nuclidic mass	47ING3	48ING2	48MAT1	53WAL1
142	141.907731	27.25	27.13 (20)	26.80 (16)	27.09 (3)
143	142.909823	12.26	12.20 (10)	12.12 (8)	12.14 (2)
144	143.910096	23.97	23.87 (20)	23.91 (12)	23.83 (3)
145	144.912582	8.23	8.30 (5)	8.35 (8)	8.29 (1)
146	145.913126	17.06	17.18 (20)	17.35 (9)	17.26 (2)
148	147.916901	5.66	5.72 (6)	5.78 (8)	5.74 (2)
150	149.920900	5.53	5.60 (6)	5.69 (8)	5.63 (2)
Isotope ratio	143/142	0.4499	0.4497	0.4522	0.4513
	144/142	0.8797	0.8798	0.8921	0.8718
	145/142	0.3020	0.3060	0.3116	0.3037
	146/142	0.6261	0.6333	0.6474	0.6264
	148/142	0.2077	0.2108	0.2157	0.2077
	150/142	0.2030	0.2064	0.2123	0.2037
Atomic weight		144.2254 (8)	144.238 (7)	144.257 (7)	144.244 (2)
Error		NS	NS	SE	SD
Annotation					

Mass no.	Nuclidic mass	56WHI1	64KOM1	76NAK1	81HOL1	83ICA1
142	141.907731	27.3 (2)	26.81 (60)	27.157	27.16 (4)	27.13 (10)
143	142.909823	12.32 (9)	12.07 (45)	12.177	12.18 (2)	12.18 (5)
144	143.910096	23.8 (2)	23.75 (60)	23.795	23.83 (4)	23.80 (10)
145	144.912582	8.29 (6)	8.39 (23)	8.293	8.30 (2)	8.30 (5)
146	145.913126	17.10 (14)	17.31 (53)	17.188	17.17 (3)	17.19 (8)
148	147.916901	5.67 (5)	5.99 (28)	5.755	5.74 (1)	5.76 (3)
150	149.920900	5.56 (5)	5.75 (35)	5.635	5.62 (1)	5.64 (3)
Isotope ratio	143/142	0.4513	0.4502	0.4484	0.4485	0.4489
	144/142	0.8719	0.8859	0.8762	0.8774	0.8773
	145/142	0.3037	0.3129	0.3054	0.3056	0.3059
	146/142	0.6260	0.6457	0.6329	0.6322	0.6336
	148/142	0.2077	0.2234	0.2113	0.2113	0.2123
	150/142	0.2037	0.2145	0.2075	0.2069	0.2079
Atomic weight		144.227 (6)	144.27 (3)	144.24123 (8)	144.239 (11)	144.242 (3)
Error		NS	NS	NS	2XSD	
Annotation				B		

Element $_{62}$Sm Samarium

1961 150.35 1969 150.4 1979 150.36 (3)

Mass no.	Nuclidic mass	48ING1	48MAT1	50HIB1	57AIT1
144	143.912009	3.16 (10)	2.95 (7)	2.87 (15)	3.02 (2)
147	146.914907	15.07 (15)	14.62 (12)	14.94 (6)	14.87 (4)
148	147.914832	11.27 (11)	10.97 (11)	11.24 (5)	11.22 (3)
149	148.917193	13.84 (14)	13.56 (12)	13.85 (6)	13.82 (4)
150	149.917285	7.47 (7)	7.27 (10)	7.36 (7)	7.40 (2)
152	151.919741	26.63 (26)	27.34 (25)	26.90 (10)	26.80 (5)
154	153.922218	22.53 (22)	23.29 (19)	22.84 (13)	22.88 (6)
Isotope ratio	144/152	0.1187	0.1079	0.1067	0.1126
	147/152	0.5659	0.5347	0.5554	0.5549
	148/152	0.4232	0.4012	0.4178	0.4187
	149/152	0.5197	0.4960	0.5149	0.5157
	150/152	0.2805	0.2659	0.2736	0.2761
	154/152	0.8460	0.8519	0.8491	0.8537
Atomic weight		150.34 (1)	150.43 (1)	150.39 (1)	150.379 (3)
Error		3XSE	NS	2XSD	NS
Annotation					

Mass no.	Nuclidic mass	57COL1	64KOM1	75LUG1	81HOL1	83ICA1
144	143.912009	3.15 (3)	3.15 (4)	3.076 (1)[c]	3.09 (1)	3.1 (1)
147	146.914907	15.09 (10)	14.93 (4)	14.995 (1)[c]	15.03 (3)	15.0 (2)
148	147.914832	11.35 (9)	11.21 (8)	11.242 (1)[c]	11.24 (2)	11.3 (1)
149	148.917193	13.96 (10)	13.70 (16)	13.819 (1)[c]	13.84 (3)	13.8 (1)
150	149.917285	7.47 (6)	7.44 (8)	7.380 (1)[c]	7.38 (2)	7.4 (1)
152	151.919741	26.55 (20)	26.65 (13)	26.738 (2)[c]	26.72 (5)	26.7 (2)
154	153.922218	22.43 (20)	22.62 (2)	22.750 (1)[c]	22.70 (4)	22.7 (2)
Isotope ratio	144/152	0.1186	0.1182	0.11502 (4)	0.1156	0.1161
	147/152	0.5684	0.5602	0.56081	0.5625	0.5618
	148/152	0.4275	0.4206	0.42045 (3)	0.4207	0.4232
	149/152	0.5258	0.5141	0.51683 (4)	0.5180	0.5169
	150/152	0.2814	0.2792	0.27602 (2)	0.2762	0.2772
	154/152	0.8448	0.8488	0.85082 (5)	0.8496	0.8502
Atomic weight		150.338 (9)	150.359 (4)	150.36558 (9)	150.361 (2)	150.36 (1)
Error		SD	NS	2XSD	2XSD	
Annotation						

Element $_{63}$Eu Europium

1961 151.96

Mass no.	Nuclidic mass	47ING3	48HES1	57COL1	64KOM1	72LOV1
151	150.919860	47.75	47.77 (25)[C]	47.86 (8)	47.86 (28)	47.794 (25)[C]
153	152.921243	52.25	52.23 (25)[C]	52.14 (8)	52.14 (28)	52.206 (25)[C]
Isotope ratio 151/153		0.9139	0.9145 (91)	0.9179	0.9179	0.9155 (9)
Atomic weight		151.9656 (2)	151.965 (5)	151.963 (2)	151.963 (6)	151.9647 (5)
Error		NS	P	SD	NS	2XSD
Annotation			B			

Mass no.	Nuclidic mass	72LOV1	81HOL1	83ICA1
151	150.919860	47.808 (50)	47.81 (3)	47.8 (5)
153	152.921243	52.192 (50)	52.19 (3)	52.2 (5)
Isotope ratio 151/153		0.9160 (18)	0.9160	0.9157
Atomic weight		151.964 (1)	151.9644 (6)	151.96 (1)
Error		2XSD	2XSD	
Annotation				

Element $_{64}$Gd Gadolinium

1961 157.25 1969 157.25 (3)

Mass no.	Nuclidic mass	47ING3	48HES1	50LEL1	57COL1
152	151.919803	0.20	0.200 (2)	0.200 (5)	0.205 (10)
154	153.920876	2.1	2.15 (2)	2.16 (2)	2.23 (3)
155	154.922629	14.90	14.78 (15)	14.68 (15)	15.10 (15)
156	155.922130	20.67	20.59 (21)	20.36 (20)	20.6 (2)
157	156.923967	15.73	15.71 (16)	15.64 (16)	15.70 (16)
158	157.924111	24.82	24.78 (25)	24.96 (25)	24.50 (25)
160	159.927061	21.77	21.79 (22)	22.01 (22)	21.6 (2)
Isotope ratio	152/158	0.00806	0.00807	0.00801	0.00837
	154/158	0.0846	0.0868	0.0865	0.0910
	155/158	0.6003	0.5964	0.5881	0.6164
	156/158	0.8328	0.8309	0.8157	0.8409
	157/158	0.6338	0.6340	0.6266	0.6409
	160/158	0.8771	0.8793	0.8818	0.8817
Atomic weight		157.247 (4)	157.250 (8)	157.262 (8)	157.232 (7)
Error		NS	P	P	SD
Annotation					

Element $_{64}$Gd Gadolinium--continued

Mass no.	Nuclidic mass	66KOM1	70EUG1	81HOL1	83ICA1
152	151.919803	0.19 (1)	0.2029 (5)	0.200 (5)	0.20 (1)
154	153.920876	2.14 (1)	2.1809 (6)	2.18 (3)	2.18 (3)
155	154.922629	14.66 (28)	14.800 (3)	14.80 (6)	14.80 (5)
156	155.922130	20.57 (48)	20.466 (2)	20.47 (8)	20.47 (4)
157	156.923967	15.71 (20)	15.652 (2)	15.65 (6)	15.65 (3)
158	157.924111	25.09 (47)	24.835 (4)	24.84 (9)	24.84 (12)
160	159.927061	21.67 (42)	21.863 (2)	21.86 (8)	21.86 (4)
Isotope ratio	152/158	0.0075	0.008170	0.00805	0.00805
	154/158	0.0853	0.08782	0.0878	0.0878
	155/158	0.5843	0.59593	0.5958	0.5958
	156/158	0.8198	0.82408	0.8241	0.8241
	157/158	0.6261	0.63024	0.6300	0.6300
	160/158	0.8637	0.88033	0.8800	0.8800
Atomic weight		157.25 (1)	157.2520 (1)	157.252 (3)	157.252 (2)
Error		NS	SD	2XSD	
Annotation			B		

Element $_{65}$Tb Terbium

1961 158.924 1969 158.9254

Mass no.	Nuclidic mass	57COL1	83ICA1
159	158.925350	100	100
Isotope ratio			
Atomic weight		158.92535 (3)	158.92535 (4)
Error		NS	
Annotation			

Element $_{66}$Dy Dysprosium

1961 162.50 1969 162.50 (3)

Mass no.	Nuclidic mass	49ING1	50LEL1	57COL1	66KOM1
156	155.924287	0.0524 (5)	0.064 $^{+0.001}_{-0.064}$	0.057 (1)	0.058 (9)
158	157.924412	0.0902 (9)	0.105 $^{+0.001}_{-0.105}$	0.100 (1)	0.092 (4)
160	159.925203	2.294 (11)	2.36 (10)	2.35 (2)	2.53 (8)
161	160.926939	18.88 (9)	18.73 (19)	19.0 (1)	19.04 (25)
162	161.926805	25.53 (13)	25.36 (25)	25.5 (2)	25.52 (15)
163	162.928737	24.97 (12)	24.91 (25)	24.9 (2)	24.87 (30)
164	163.929183	28.18 (14)	28.47 $^{+0.25}_{-0.56}$	28.1 (2)	28.18 (30)
Isotope ratio	156/164	0.00186	0.00225	0.00203	0.0021
	158/164	0.00320	0.00367	0.00356	0.0033
	160/164	0.0814	0.0829	0.0836	0.0898
	161/164	0.6700	0.6579	0.6762	0.6757
	162/164	0.9060	0.8908	0.9075	0.9056
	163/164	0.8861	0.8750	0.8861	0.8825
Atomic weight		162.499 (3)	162.50 (1)	162.495 (4)	162.492 (7)
Error		P	P	SD	NS
Annotation					

Mass no.	Nuclidic mass	81HOL1	83ICA1
156	155.924287	0.056 (1)	0.06 (1)
158	157.924412	0.096 (2)	0.10 (1)
160	159.925203	2.34 (2)	2.34 (5)
161	160.926939	18.91 (5)	18.9 (1)
162	161.926805	25.51 (7)	25.5 (2)
163	162.928737	24.90 (7)	24.9 (2)
164	163.929183	28.19 (8)	28.2 (2)
Isotope ratio	156/164	0.00199	0.00213
	158/164	0.00341	0.00355
	160/164	0.0830	0.0830
	161/164	0.6708	0.6702
	162/164	0.9049	0.9043
	163/164	0.8833	0.8830
Atomic weight		162.498 (2)	162.498 (4)
Error		2XSD	
Annotation		B	

Element $_{67}$Ho Holmium

1961 164.930 1969 164.9303 1971 164.9304

Mass no.	Nuclidic mass	50LEL1	57COL1	83ICA1
165	164.930332	100	100	100
Isotope ratio				
Atomic weight		164.93033 (4)	164.93033 (4)	164.93033 (4)
Error		NS	NS	
Annotation				

Element $_{68}$Er Erbium

1961 167.26 1969 167.26 (3)

Mass no.	Nuclidic mass	41WAH2	50HAY1	50LEL1	66KOM1
162	161.928787	0.1	0.136 (3)	0.154 (7)	0.258 (4)
164	163.929211	1.5	1.56 (3)	1.60 (2)	1.91 (1)
166	165.930305	32.9	33.41 (30)	33.36 (33)	33.23 (16)
167	166.932061	24.4	22.94 (20)	22.82 (23)	22.80 (25)
168	167.932383	26.9	27.07 (30)	27.02 (27)	26.82 (40)
170	169.935476	14.2	14.88 (20)	15.04 (15)	14.96 (20)
Isotope ratio	162/166	0.00304	0.00407	0.00462	0.0078
	164/166	0.0456	0.0467	0.04796	0.0575
	167/166	0.7416	0.6866	0.6841	0.6891
	168/166	0.8176	0.8102	0.8100	0.8071
	170/166	0.4316	0.4454	0.4508	0.4502
Atomic weight		167.248 (7)	167.262 (7)	167.264 (6)	167.247 (7)
Error		NS	P	P	NS
Annotation					

Element $_{68}$Er Erbium--continued

Mass no.	Nuclidic mass	81HOL1	83CICA1
162	161.928787	0.137 (1)	0.14 (1)
164	163.929211	1.609 (5)	1.61 (4)
166	165.930305	33.61 (7)	33.6 (2)
167	166.932061	22.93 (5)	22.95 (13)
168	167.932383	26.79 (7)	26.8 (2)
170	169.935476	14.93 (5)	14.9 (1)
Isotope ratio	162/166	0.00408	0.00417
	164/166	0.0389	0.0479
	167/166	0.6822	0.6830
	168/166	0.7971	0.7976
	170/166	0.4442	0.4435
Atomic weight		167.257 (2)	167.256 (4)
Error		2XSD	
Annotation		B	

Element $_{69}$Tm Thulium

1961 168.934 1969 168.9342

Mass no.	Nuclidic mass	50LAG1	57COL1	83ICA1
169	168.934225	100	100	100
Isotope ratio				
Atomic weight		168.93423 (4)	168.93423 (4)	168.93423 (4)
Error		NS	NS	
Annotation				

Element $_{70}$Yb Ytterbium

1961 173.04 1969 173.04 (3)

Mass no.	Nuclidic mass	41WAH1	49HAY1	50LEL1	57COL1
168	167.933908	0.06	0.140 (2)	0.130 (5)	0.135 (2)
170	169.934774	4.21	3.034 (30)	3.03 (3)	3.140 (15)
171	170.936338	14.26	14.34 (14)	14.27 (14)	14.4 (2)
172	171.936393	21.49	21.88 (22)	21.77 (22)	21.90 (25)
173	172.938222	17.02	16.18 (16)	16.08 (16)	16.2 (2)
174	173.938873	29.58	31.77 (32)	31.91 (32)	31.6 (4)
176	175.942576	13.38	12.65 (13)	12.80 (13)	12.60 (15)
Isotope ratio	168/174	0.00203	0.00441	0.00407	0.00427
	170/174	0.1423	0.0955	0.0950	0.0994
	171/174	0.4820	0.4514	0.4472	0.4557
	172/174	0.7264	0.6887	0.6822	0.6930
	173/174	0.5753	0.5093	0.5039	0.5126
	176/174	0.4522	0.3982	0.4011	0.3987
Atomic weight		173.0060 (7)	173.031 (6)	173.041 (6)	173.024 (6)
Error		NS	P	P	SD
Annotation					

Mass no.	Nuclidic mass	66KOM1	77MCC1	81HOL1	83ICA1
168	167.933908	0.22 (9)	0.136 (1)[C]	0.127 (2)	0.13 (1)
170	169.934774	3.43 (10)	3.063 (3)[C]	3.04 (2)	3.05 (5)
171	170.936338	14.06 (30)	14.334 (9)[C]	14.28 (8)	14.3 (2)
172	171.936393	21.82 (15)	21.879 (10)[C]	21.83 (10)	21.9 (3)
173	172.938222	16.05 (18)	16.122 (9)[C]	16.13 (7)	16.12 (18)
174	173.938873	31.53 (30)	31.768 (20)[C]	31.83 (14)	31.8 (4)
176	175.942576	12.86 (18)	12.698 (6)[C]	12.76 (5)	12.7 (1)
Isotope ratio	168/174	0.0070	0.00429 (5)	0.00399	0.00409
	170/174	0.1088	0.0964 (1)	0.0955	0.0959
	171/174	0.4459	0.4512	0.4486	0.4497
	172/174	0.6920	0.6887 (4)	0.6858	0.6887
	173/174	0.5090	0.5075 (3)	0.5068	0.5069
	176/174	0.4079	0.3997 (2)	0.4009	0.3994
Atomic weight		173.02 (1)	173.0327 (3)	173.038 (3)	173.034 (7)
Error		NS	2XSE	2XSD	
Annotation			B		

Element $_{71}$Lu Lutetium

1961 174.97 1977 174.967 (3) 1981 174.967 (1)

Mass no.	Nuclidic mass	39MAT2	50HAY1	57COL1	76MCC1
175	174.940785	97.485 (6)[c]	97.40 (3)	97.412 (13)	97.393 (5)
176	175.942694	2.515 (67)[c]	2.60 (3)	2.588 (13)	2.607 (5)
Isotope ratio 176/175		0.0258 (7)	0.02669	0.02657	0.02677 (5)
Atomic weight		174.9660 (7)	174.9668 (3)	174.9667 (1)	174.96690 (5)
Error		NS	P	SD	2XSD
Annotation					

Mass no.	Nuclidic mass	81HOL1	83PAT1	83ICA1
175	174.940785	97.41 (2)	97.416 (5)[c]	97.41 (2)
176	175.942694	2.59 (2)	2.584 (5)[c]	2.59 (2)
Isotope ratio 176/175		0.02659	0.026525 (20)	0.02669
Atomic weight		174.9667 (2)	174.96667 (5)	174.9667 (2)
Error		2XSD	2XSD	
Annotation			B	

Element $_{72}$Hf Hafnium

1961 178.49 1969 178.49 (3)

Mass no.	Nuclidic mass	43MAT1	49HIB2	53REY1	56WHI1
174	173.940065	0.18 (1)	0.18 (1)	0.199 $^{+0.003}_{-0.010}$	0.163 (2)
176	175.941420	5.30 (11)	5.15 (2)	5.23 (5)	5.21 (2)
177	176.943233	18.47 (9)	18.39 (1)	18.55 (17)	18.56 (6)
178	177.943710	27.13 (14)	27.08 (4)	27.23 (22)	27.10 (10)
179	178.945827	13.85 (7)	13.78 (2)	13.73 (13)	13.75 (5)
180	179.946561	35.14 (18)	35.44 (6)	35.07 (24)	35.22 (10)
Isotope ratio	174/180	0.00508	0.00508	0.00567	0.00463
	176/180	0.1509	0.1453	0.1491	0.1479
	177/180	0.5260	0.5189	0.5289	0.5270
	178/180	0.7715	0.7641	0.7765	0.7695
	179/180	0.3944	0.3888	0.3915	0.3904
Atomic weight		178.488 (4)	178.497 (1)	178.485 (5)	178.491 (2)
Error		P	SD	P	NS
Annotation					

Element $_{72}$Hf Hafnium--continued

Mass no.	Nuclidic mass	75TAM1	83PAT1	83ICA1
174	173.940065	0.155 (1)[c]	0.1621 (9)	0.162 (2)
176	175.941420	5.193 (19)[c]	5.2056 (12)	5.206 (4)
177	176.943233	18.484 (37)[c]	18.6060 (13)	18.606 (3)
178	177.943710	27.261 (27)[c]	27.2969 (13)	27.297 (3)
179	178.945827	13.652 (35)[c]	13.6289 (19)	13.629 (5)
180	179.946561	35.255 (1)[c]	35.1005 (22)	35.100 (6)
Isotope ratio	174/180	0.00438 (1)	0.004618	0.00455
	176/180	0.1473 (4)	0.148306	0.1477
	177/180	0.5243 (15)	0.530078	0.5204
	178/180	0.7733 (23)	0.777678	0.7699
	179/180	0.3872 (1)	0.388282	0.3903
Atomic weight		178.4915 (8)	178.48643 (7)	178.490 (9)
Error		NS	NS	
Annotation			B	

Element $_{73}$Ta Tantalum

1961 180.948 1969 180.9479 (3) 1979 180.9479

Mass no.	Nuclidic mass	55WHI1	56WHI1	58PAL1	83ICA1
180	179.947489	0.0123 (3)	0.0123 (3)	0.0117 (6)	0.012 (2)
181	180.948014	99.988	99.9877 (3)	99.9883 (6)	99.988 (2)
Isotope ratio	180/181	0.0001230	0.0001233	0.0001170	0.0001200
Atomic weight		180.947891(3)	180.947891 (3)	180.947897 (6)	180.94789 (2)
Error		NS	NS	NS	
Annotation			B		

Element $_{74}$W Tungsten

1961 183.85 1969 183.85 (3)

Mass no.	Nuclidic mass	46ING1	46WIL1	48MAT1	48WHI1
180	179.946727	0.122 (2)	0.130 (2)	0.160 (4)	0.126 (6)
182	181.948225	25.77 (30)	26.41 (53)	26.35 (8)	26.31 (3)
183	182.950245	14.24 (20)	14.40 (29)	14.32 (11)	14.28 (1)
184	183.950953	30.68 (30)	30.64 (61)	30.68 (12)	30.64 (3)
186	185.954377	29.17 (30)	28.41 (57)	28.49 (9)	28.64 (1)
Isotope ratio	180/183	0.00857	0.0090	0.01117	0.00882
	182/183	1.8097	1.834	1.8401	1.8424
	184/183	2.1545	2.128	2.1425	2.1457
	186/183	2.0485	1.973	1.9895	2.0056
Atomic weight		183.872 (6)	183.84 (2)	183.844 (3)	183.8498 (7)
Error		P	P	NS	SE
Annotation					B

Mass no.	Nuclidic mass	49HIB2	600MU1	83ICA1
180	179.946727	0.143 (2)	0.116 (10)	0.13 (3)
182	181.948225	26.09 (12)	26.47 (12)	26.3 (2)
183	182.950245	14.24 (2)	14.27 (7)	14.3 (1)
184	183.950953	30.68 (1)	30.62 (9)	30.67 (15)
186	185.954377	28.85 (1)	28.55 (12)	28.6 (2)
Isotope ratio	180/183	0.0100	0.00813	0.00909
	182/183	1.8322	1.8549	1.8392
	184/183	2.1545	2.1458	2.1448
	186/183	2.0260	2.0007	2.0000
Atomic weight		183.8582 (3)	183.845 (3)	183.849 (6)
Error		SD	NS	
Annotation				

Element $_{75}$Re Rhenium

1961 186.2 1973 186.207

Mass no.	Nuclidic mass	47HES1	48WHI1	73GRA1	83ICA1
185	184.952977	37.244 (69)	37.07 (6)	37.398 (16)	37.40 (2)
187	186.955765	62.756 (69)	62.93 (6)	62.602 (16)	62.60 (2)
Isotope ratio	185/187	0.5935 (18)	0.5891	0.59738 (39)	0.59744
Atomic weight		186.210 (1)	186.213 (1)	186.2068 (3)	186.2068 (3)
Error		NS	SE	3XSD	
Annotation				C, B	

Element $_{76}$Os Osmium

1961 190.2

Mass no.	Nuclidic mass	37NIEI	83ICAI
184	183.952514	0.018 (2)	0.02 (1)
186	185.953852	1.59 (5)	1.58 (10)
187	186.955762	1.64 (5)	1.6 (1)
188	187.955850	13.27 (11)	13.3 (2)
189	188.958156	16.14 (15)	16.1 (3)
190	189.958455	26.38 (20)	26.4 (4)
192	191.961487	40.96 (14)	41.0 (3)
Isotope ratio	184/188	0.009	0.0015
	186/188	0.120	0.119
	187/188	0.124	0.120
	189/188	1.216	1.210
	190/188	1.988	1.985
	192/188	3.087	3.083
Atomic weight		190.238 (5)	190.24 (1)
Error		P	
Annotation		B	

Element $_{77}$Ir Iridium

1961 192.2 1969 192.22 (3)

Mass no.	Nuclidic mass	54BALI	83ICAI
191	190.960603	37.3	37.3 (5)
193	192.962942	62.7	62.7 (5)
Isotope ratio	191/193	0.5949	0.5949
Atomic weight		192.216 (2)	192.22 (1)
Error		NS	
Annotation		B	

Element $_{78}$Pt Platinum

1961 195.09 1969 195.09 (3)

Mass no.	Nuclidic mass	47ING3	56WHI1	83ICA1
190	189.959937	0.09	0.0127 (5)	0.01 (1)
192	191.961049	0.78	0.78 (1)	0.79 (5)
194	193.962679	32.8	32.9 (1)	32.9 (5)
195	194.964785	33.7	33.8 (1)	33.8 (5)
196	195.964947	25.4	25.2 (1)	25.3 (5)
198	197.967879	7.23	7.19 (4)	7.2 (2)
Isotope ratio	190/195	0.0027	0.000376	0.00030
	192/195	0.0231	0.02308	0.02237
	194/195	0.9733	0.9734	0.9734
	196/195	0.7537	0.7456	0.7485
	198/195	0.2145	0.2127	0.2130
Atomic weight		195.079 (2)	195.079 (2)	195.080 (9)
Error		NS	NS	
Annotation			B	

Element $_{79}$Au Gold

1961 196.967 1969 196.9665

Mass no.	Nuclidic mass	63LEI1	83ICA1
197	196.966560	100	100
Isotope ratio			
Atomic weight		196.96656 (3)	196.96656 (4)
Error		NS	
Annotation			

Element $_{80}$Hg Mercury

1961 200.59 1969 200.59 (3)

Mass no.	Nuclidic mass	47ING1	49HIB2	50NIE2	50NIE2
196	195.965812	0.155	0.16 (3)	0.147 (4)	0.146 (20)[c]
198	197.966760	10.12	10.02 (6)	10.067 (101)	10.018 (9)[c]
199	198.968269	17.01	16.92 (7)	17.000 (170)	16.837 (15)[c]
200	199.968316	23.21	23.10 (8)	23.050 (230)	23.127 (15)[c]
201	200.970293	13.15	13.22 (6)	13.224 (132)	13.222 (14)[c]
202	201.970632	29.66	29.72 (9)	29.731 (297)	29.799 (18)[c]
204	203.973481	6.69	6.84 (6)	6.781 (68)	6.851 (5)[c]
Isotope ratio	196/202	0.0052	0.0054	0.00494	0.00491
	198/202	0.3412	0.3372	0.3386	0.3362 (3)
	199/202	0.5735	0.5693	0.5718	0.5650 (5)
	200/202	0.7825	0.7773	0.7753	0.7761 (5)
	201/202	0.4434	0.4448	0.4448	0.4437 (6)
	204/202	0.2256	0.2302	0.2281	0.2299 (2)
Atomic weight		200.5830 (5)	200.594 (3)	200.590 (6)	200.597 (1)
Error		NS	SD	P	P
Annotation					B

Mass no.	Nuclidic mass	55DIB1	83ICA1
196	195.965812	0.156 (1)	0.14 (10)
198	197.966760	10.12 (10)	10.02 (7)
199	198.968269	16.99 (9)	16.84 (11)
200	199.968316	23.07 (12)	23.13 (11)
201	200.970293	13.27 (7)	13.22 (11)
202	201.970632	29.64 (15)	29.80 (14)
204	203.973481	6.97 (5)	6.85 (5)
Isotope ratio	196/202	0.005263	0.00506
	198/202	0.3414	0.3406
	199/202	0.5732	0.5734
	200/202	0.7783	0.7791
	201/202	0.4477	0.4452
	204/202	0.2291	0.2293
Atomic weight		200.588 (4)	200.59 (2)
Error		P	
Annotation			

Element $_{81}$Tl Thallium

1961 204.37 1969 204.37 (3) 1979 204.383

Mass no.	Nuclidic mass	38NIE1	48PAU1	48WHI1	49HIB2
203	202.972336	29.08 (40)[c]	30.07 (49)	29.46 (5)	29.52 (5)
205	204.974410	10.92 (40)[c]	69.93 (49)	70.54 (5)	70.48 (7)
Isotope ratio 203/205		0.410 (8)	0.4300	0.4176	0.4188
Atomic weight		204.393 (8)	204.37 (1)	204.385 (1)	204.383 (1)
Error		NS	3XSD	P	SD
Annotation					

Mass no.	Nuclidic mass	78MUR2	80DUN1	83ICA1
203	202.972336	29.665 (45)[c]	29.524 (9)	29.524 (9)
205	204.974410	70.335 (45)[c]	70.476 (9)	70.476 (9)
Isotope ratio 203/205		0.4218 (9)	0.41891 (18)	0.41892
Atomic weight		204.3805 (9)	204.3833 (2)	204.3833 (2)
Error		SD	3XSD	
Annotation			C, B	

Element $_{82}$Pb Lead

1961 207.19 1969 207.2

Mass no.	Nuclidic mass	38NIE3	38NIE3	41NIE1	41NIE1
204	203.973037	1.48	1.26	1.544 (19)[c]	1.230 (15)[c]
206	205.974455	23.59	27.31	22.61 (43)[c]	27.47 (50)[c]
207	206.975885	22.64	20.00	22.62 (43)[c]	19.87 (39)[c]
208	207.976641	52.29	51.43	53.23 (60)[c]	51.43 (61)[c]
Isotope ratio	204/206	0.0627	0.0461	0.0683	0.0448
	207/206	0.9597	0.7323	1.0004	0.7233
	208/206	2.2166	1.8832	2.3543	1.8722
Atomic weight		207.2185 (4)	207.1792 (4)	207.236 (7)	207.179 (8)
Error		P	NS	P	P
Annotation					

Element $_{82}$Pb Lead--continued

Mass no.	Nuclidic mass	48WHI1	50HIB1	50HIB1	52COL1
204	203.973037	1.37 (14)	1.372 (16)	1.360 (5)	1.647 (10)[c]
206	205.974455	25.15 (25)	26.24 (2)	26.29 (3)	20.84 (21)[c]
207	206.975885	21.11 (21)	20.82 (3)	20.82 (4)	23.51 (22)[c]
208	207.976641	52.38 (52)	51.57 (3)	51.53 (3)	54.00 (30)[c]
Isotope ratio	204/206	0.0545	0.0523	0.0517	0.0790
	207/206	0.8394	0.7934	0.7919	1.1281
	208/206	2.0827	1.9653	1.9601	2.5912
Atomic weight		207.207 (5)	207.188 (6)	207.1875 (5)	207.258 (4)
Error		P	2XSD	2XSD	P
Annotation					

Mass no.	Nuclidic mass	52COL1	52DIB1	53ALL1	53ALL1
204	203.973037	1.0400 (66)	1.32 (2)	1.52	1.65
206	205.974455	27.04 (25)	26.67 (20)	22.54	20.84
207	206.975885	17.62 (18)	20.50 (20)	22.70	23.51
208	207.976641	54.30 (30)	51.50 (30)	53.24	54.00
Isotope ratio	204/206	0.0385	0.0495	0.0674	0.0792
	207/206	0.6516	0.7687	1.0071	1.1281
	208/206	2.0081	1.9310	2.3620	2.5912
Atomic weight		207.217 (4)	207.185 (3)	207.2373 (4)	207.2580 (4)
Error		P	P	NS	NS
Annotation					

Mass no.	Nuclidic mass	53EHR1	53EHR1	53FAR1	53FAR1
204	203.973037	1.3478 (60)[c]	1.3560 (51)[c]	1.440 (9)	1.455 (7)
206	205.974455	24.824 (64)[c]	25.158 (23)[c]	23.69 (2)	23.64 (5)
207	206.975885	21.448 (79)[c]	21.133 (60)[c]	22.54 (4)	22.61 (3)
208	207.976641	52.38 (12)[c]	52.354 (56)[c]	52.33 (4)	52.30 (7)
Isotope ratio	204/206	0.0543 (2)	0.0539 (2)	0.0608	0.0615
	207/206	0.864 (3)	0.8400 (3)	0.9515	0.9564
	208/206	2.110 (10)	2.0810 (2)	2.2089	2.2124
Atomic weight		207.211 (1)	207.2071 (6)	207.2191 (5)	207.2188 (8)
Error		NS	NS	SD	SD
Annotation					

Element $_{82}$Pb Lead--continued

Mass no.	Nuclidic mass	54BEG1	54BEG1	54EHR1	54EHR1	54GEI1
204	203.973037	1.33	1.32	1.3528 (52)[c]	1.3899 (72)[c]	1.3517 (80)[c]
206	205.974455	25.43	25.38	25.006 (28)[c]	24.820 (93)[c]	25.172 (52)[c]
207	206.975885	20.94	20.90	21.280 (45)[c]	21.420 (89)[c]	21.044 (58)[c]
208	207.976641	52.30	52.40	52.362 (54)[c]	52.37 (18)[c]	52.433 (99)[c]
Isotope ratio	204/206	0.0523	0.0520	0.0541 (2)	0.0560 (2)	0.0537 (3)
	207/206	0.8234	0.8235	0.851 (2)	0.8630 (2)	0.836 (2)
	208/206	2.0566	2.0646	2.094 (4)	2.110 (15)	2.083 (8)
Atomic weight		207.2047 (4)	207.2065 (4)	207.2088 (6)	207.209 (2)	207.207 (1)
Error		NS	NS	NS	NS	3XSD
Annotation						

Mass no.	Nuclidic mass	54GEI1	54RUS1	54RUS1	55EBE1
204	203.973037	1.3846 (55)[c]	1.43	1.64	1.3237 (52)[c]
206	205.974455	24.592 (46)[c]	23.30	20.84	25.455 (28)[c]
207	206.975885	21.986 (67)[c]	22.77	23.52	20.962 (37)[c]
208	207.976641	52.037 (91)[c]	52.51	54.02	52.259 (53)[c]
Isotope ratio	204/206	0.0563 (2)	0.0614	0.0787	0.0520 (2)
	207/206	0.894 (3)	0.9773	1.1286	0.8235 (15)
	208/206	2.116 (7)	2.2536	2.5921	2.053 (4)
Atomic weight		207.2080 (9)	207.2251 (4)	207.2584 (4)	207.2042 (6)
Error		3XSD	NS	NS	3XSD
Annotation					

Mass no.	Nuclidic mass	55EBE1	55SAK1	55SAK1	56KUL1
204	203.973037	1.6473 (42)[c]	1.37	1.34	1.21
206	205.974455	20.9707 (72)[c]	25.03	25.03	27.48
207	206.975885	23.592 (24)[c]	21.08	21.18	19.53
208	207.976641	53.790 (18)[c]	52.53	52.45	51.78
Isotope ratio	204/206	0.07855 (20)	0.0547	0.0535	0.0440
	207/206	1.1250 (15)	0.8422	0.8462	0.7107
	208/206	2.565 (6)	2.0987	2.0955	1.8843
Atomic weight		207.2547 (2)	207.2098 (4)	207.2099 (4)	207.1825 (4)
Error		3XSD	NS	NS	NS
Annotation					

Element $_{82}$Pb Lead--continued

Mass no.	Nuclidic mass	56KUL1	56WHI1	57RUS1	57RUS1
204	203.973037	1.35	1.40 (2)	1.64	1.07
206	205.974455	25.24	25.2 (1)	20.99	24.81
207	206.975885	21.12	21.7 (1)	23.57	17.91
208	207.976641	52.29	51.7 (2)	53.80	56.21
Isotope ratio	204/206	0.0535	0.0556	0.0781	0.0431
	207/206	0.8368	0.8611	1.1229	0.7219
	208/206	2.0717	2.0516	2.5631	2.2656
Atomic weight		207.2059 (4)	207.199 (2)	207.2548 (4)	207.2578 (4)
Error		NS	NS	NS	NS
Annotation					

Mass no.	Nuclidic mass	58EHR1	58EHR1	58PAL1
204	203.973037	1.396 (15)[C]	1.3569 (51)[C]	1.560 (15)
206	205.974455	24.577 (62)[C]	25.059 (21)[C]	22.50 (17)
207	206.975885	21.677 (72)[C]	21.187 (34)[C]	22.61 (17)
208	207.976641	52.35 (12)[C]	52.397 (41)[C]	53.33
Isotope ratio	204/206	0.0568 (6)	0.05415 (2)	0.0693
	207/206	0.8820 (25)	0.8455 (15)	1.0049
	208/206	2.130 (10)	2.091 (3)	2.3702
Atomic weight		207.212 (1)	207.2086 (4)	207.237 (3)
Error		NS	NS	NS
Annotation				

Mass no.	Nuclidic mass	58SAK1	58SAK1	58TIL1	58TIL1
204	203.973037	1.3537 (30)[C]	1.3528 (30)[C]	1.3330 (67)[C]	1.3587 (77)[C]
206	205.974455	25.058 (74)[C]	25.054 (74)[C]	25.473 (27)[C]	25.203 (67)[C]
207	206.975885	21.118 (70)[C]	21.131 (70)[C]	21.000 (83)[C]	21.269 (99)[C]
208	207.976641	52.47 (11)[C]	52.46 (11)[C]	52.194 (56)[C]	52.17 (13)[C]
Isotope ratio	204/206	0.05402	0.05400	0.05233 (26)	0.05391 (27)
	207/206	0.84277	0.84342	0.8244 (41)	0.8439 (42)
	208/206	2.09394	2.09388	2.049 (10)	2.070 (10)
Atomic weight		207.210 (1)	207.210 (1)	207.2031 (6)	207.204 (1)
Error		SE	SE	P	P
Annotation					

Element $_{82}$Pb Lead--continued

Mass no.	Nuclidic mass	59FER1	60CAT1	60CAT1	60KOL1
204	203.973037	1.366 (16)[C]	1.568 (13)[C]	1.3658 (99)[C]	1.4551 (15)[C]
206	205.974455	24.99 (14)[C]	22.13 (32)[C]	24.83 (29)[C]	23.450 (11)[C]
207	206.975885	21.29 (20)[C]	23.51 (32)[C]	21.41 (25)[C]	22.615 (19)[C]
208	207.976641	52.35 (25)[C]	52.79 (42)[C]	52.40 (36)[C]	52.480 (23)[C]
Isotope ratio	204/206	0.05465 (55)	0.0708 (11)	0.0550 (7)	0.06205 (6)
	207/206	0.8520 (85)	1.062 (10)	0.862 (8)	0.9644 (9)
	208/206	2.0950 (210)	2.383 (20)	2.110 (14)	2.2380 (18)
Atomic weight		207.208 (3)	207.235 (5)	207.211 (5)	207.2226 (2)
Error		NS	NS	NS	SD
Annotation					

Mass no.	Nuclidic mass	62DOE1	62DOE1	63RIC1	63RIC1
204	203.973037	1.46	1.37	1.425 (2)	1.458 (2)
206	205.974455	23.42	24.89	24.56 (1)	23.48 (1)
207	206.975885	22.62	21.45	22.36 (2)	22.54 (2)
208	207.976641	52.50	52.29	51.65 (2)	52.52 (2)
Isotope ratio	204/206	0.0622	0.0549	0.05802	0.06208
	207/206	0.9658	0.8621	0.91042	0.95997
	208/206	2.2421	2.1011	2.10301	2.23680
Atomic weight		207.2437 (4)	207.2088 (4)	207.2041 (2)	207.2189 (2)
Error		NS	NS	SE	SD
Annotation					

Mass no.	Nuclidic mass	66TAT1	66TAT1	68CAT1	69GRA1
204	203.973037	1.346	1.318	1.4245 (12)	1.39
206	205.974455	24.795	25.797	24.1447 (57)	25.10
207	206.975885	21.103	20.771	22.0827 (27)	21.36
208	207.976641	52.756	52.114	52.3481 (86)	52.15
Isotope ratio	204/206	0.0543	0.0511	0.059042 (37)	0.0553
	207/206	0.8511	0.8052	0.91464 (33)	0.8508
	208/206	2.1277	2.0202	2.1681 (8)	2.0774
Atomic weight		207.21512 (4)	207.19950 (4)	207.2152 (1)	207.2047 (4)
Error		NS	NS	3XSD	NS
Annotation				C, B	

Element $_{82}$Pb Lead--continued

Mass no.	Nuclidic mass	75BAR3	78YAM1	78YAM1	83ICA1
204	203.973037	1.3439 (7)	1.600	1.617	1.4 (1)
206	205.974455	25.353 (13)	24.771	25.194	24.1 (1)
207	206.975885	21.075 (13)	21.263	21.163	22.1 (1)
208	207.976641	52.228 (26)	52.366	52.026	52.4 (1)
Isotope ratio	204/206	0.05300	0.0646	0.0642	0.0581
	207/206	0.83127	0.8584	0.8400	0.9170
	208/206	2.0600	2.114	2.065	2.1743
Atomic weight		207.2043 (3)	207.20383 (4)	207.19568 (4)	207.217 (4)
Error		2XSD	NS	NS	
Annotation					

Element $_{83}$Bi Bismuth

1961 208.980 1969 208.9806 1971 208.9804

Mass no.	Nuclidic mass	38NIE1	63LEI1	83ICA1
209	208.980388	100	100	100
Isotope ratio				
Atomic weight		208.98039 (3)	208.98039 (3)	208.98039 (3)
Error		NS	NS	
Annotation				

Element $_{90}$Th Thorium

1961 232.038 1969 232.0381

Mass no.	Nuclidic mass	36DEM1	83ICA1
232	232.038053805	100	100
Isotope ratio			
Atomic weight		232.03805 (2)	232.03805 (2)
Error		NS	
Annotation			

Element $_{92}$U Uranium

1961 238.03 1969 238.029 1979 238.0289

Mass no.	Nuclidic mass	39NIE1	46CHA1	46FOX1	46FOX1
234	234.040947400	0.00591 (60)[c]	0.005040 (30)[c]	0.00555 (17)[c]	0.00555 (17)[c]
235	235.043925247	0.7148 (71)[c]	0.7131 (60)[c]	0.7246 (36)[c]	0.7193 (16)[c]
238	238.050785782	99.2793 (71)[c]	99.2818 (60)[c]	99.2699 (37)[c]	99.2751 (16)[c]
Isotope ratio	234/238	0.000060 (6)	0.000051 (3)	0.000056 (2)	0.000056 (2)
	235/238	0.007200 (72)	0.007183	0.007299 (36)	0.007246 (16)
Atomic weight		238.0291 (2)	238.0291 (2)	238.0288 (1)	238.02893 (5)
Error		P	P	NS	NS
Annotation					

Mass no.	Nuclidic mass	56LOU1	56WHI1
234	234.040947400	0.0057 (2)[c]	0.0056 (1)
235	235.043925247	0.7204 (7)[c]	0.718 (5)
238	238.050785782	99.2739 (7)[c]	99.276 (5)
Isotope ratio	234/238	0.000058 (2)	0.000056
	235/238	0.007257 (7)	0.007232
Atomic weight		238.02890 (2)	238.0289 (2)
Error		SD	NS
Annotation			

Mass no.	Nuclidic mass	69SMI1 76COW1	69SMI1 76COW1	83ICA1
234	234.040947400	0.005448 (2)	0.00508 (2)	0.0055 (5)
235	235.043925247	0.7200 (1)	0.7196 (1)	0.7200 (12)
238	238.050785782	99.2745 (10)	99.2753 (10)	99.2745 (15)
Isotope ratio	234/238	0.000055	0.000051	0.0000554
	235/238	0.007253	0.007249	0.0072526
Atomic weight		238.02879 (3)	238.02890 (3)	238.0289 (1)
Error		SD	SD	
Annotation		B	B	

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