

Specific Gravity Readings for Common World Coins

(Displaying a Variety of Base and Precious Metals)

Prefaced with a chart of the standard coin metals and their
specific gravities, for reference purposes.

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SPECIFIC GRAVITIES of Typical Metals (et al) Seen in Modern Coinage – A Presentation of the Primary Alloys Encountered

Aluminum 6061	2.72
Aluminum 7050	2.8
Aluminum (pure form)	2.71
Brass (yellow ASTM B36)	8.47
Brass (Cu .60 and Zi .40)	8.52
Bronze (Cu with 8-14% Sn)	7.400 – 8.900
Aluminum Bronze (ASTM B169)	7.8
Iron (pure)	7.85 – 7.87
Columbium (also Niobium)	8.57 – 8.6
Copper (pure)	8.93 – 8.96
Cupronickel (.75 Cu, .25 Ni)	8.5
Cupronickel (60/40)	8.4
Gold (pure)	19.32
Chromium (pure)	7.19
Magnesium (pure)	1.74
Manganese (pure)	7.44
Nickel (pure)	8.86 – 8.9
Silver (pure)	10.49 – 10.50
Silver (.90 Ag, .10 Cu)	10.3
Steel (with 1% C)	7.83
Stainless Steel (.864 Fe, .135 Cr, .001 C)	7.75
Zinc (pure)	7.14
Tin (pure)	7.28
Lead (pure)	11.35
Silicon (pure)	2.33
Titanium (pure)	4.5
Platinum (pure)	21.4

SG for various silver alloys (where remainder is copper):

.999 = 10.49 (ASEs, silver rounds and bullion should test to this)
 .935 = 10.41 (Some Spanish colonials)
 .925 = 10.39 (Sterling silver, ie Canada to 1919, Australia to 1945)
 .917 = 10.38 (Some Spanish colonials)
 .900 = 10.31 (US Coin silver)
 .850 = 10.23 (Swiss silver coinage)
 .800 = 10.17 (Canada to 1967)
 .750 = 10.08
 .600 = 9.84
 .500 = 9.68 (most Australian pre-decimal silver after 1945)
 .400 = 9.53
 .300 = 9.38
 .200 = 9.23
 .100 = 9.09 (Mexico billon Pesos 1957-67)

The above silver ratio chart is from “KurtS” of the forum, www.coincommunity.com. He has not posted since 2010. In his research on that forum, he too found many lower SG readings for US silver coins, quite a few were NOT 90% Ag.. One is left to wonder!!

May this present spread sheet assist you in your study of numismatics.

Mr. Gary S. Dykes - webmaster of:

www.Biblical-data.org

First: love of God and Theology

Second: loving my wife

Third: serving my brethren in the body of Christ

Numismatics is down there somewhere. :-)

Sheet1

Composition	Coin Type	Specific Gravity	Comments
CuNi	1 Lilangeni Swaziland, 1979	8.92	These coins are minted in Germany.
Ni plated SS	5 Rouble Russia, 2012	8.09	Coin shows surrender of Paris, as with most stainless steel based coins, the relief is low.
Ni	1 Rupee India, 1947	8.89	A 2 year type, with the beautiful tiger! For some unknown reason this nickel metal looks stunning.
Sn	1 Satang Thailand, 1942+	7.31	Also in 1967-1973 about 790,000 were minted, apparently the date BE2485 was frozen.
CuNi	5 cent Nickel Unites States :, 2002-D	8.89	.750 Cu, .250 Ni, high perhaps more Ni
CuSn + Zi see NOTE #1	1 Lincoln cent United States, 1977-D	8.66	.950 Cu, .050 Sn and Zi Usually referred to as "bronze cents"
ZiCu see NOTE #1	1 Lincoln cent United States, 2015-D	6.94	.975 Zi, .025 Cu: inner core .992 Zi and .008 Cu Inner core was then electroplated with a thin layer of pure Cu. This results in the final .975 & .025
Alum/Bronze	50 Centimes Algeria, 1971	8.68	Though not "glowing" this aluminum/bronze alloy still looks good. Ages well. .0712" thick at center.
Alum/Bronze	20 Francs France, 1950	7.66	Counterfeits of this coin exist; this coin is authentic.

Sheet2

Composition	Coin Type	Specific Gravity	Comments
Alum/Bronze	20 Centimes France, 2000	7.9	Shows the beautiful golden color, typical of some fresh aluminum/bronze alloys.
Alum/Bronze	50 Centimes France, 1923	7.69	One of the few coins with its composition indicated on the coin itself.
Alum/Bronze/Tin	10 Pennia Finland, 1980	8.09	Another beautiful aluminum/bronze colored coin, it glows! Al, Cu and Sn.
Acmonital see note #2 Fe, Cr, Mn, Ni +	100 Lire Italy, 1978	7.6	A later type of Acmonital, a stainless steel similar to AISI 430 (magnetic)
Acmonital see note #2 Fe, Cr, Mn, Ni +	50 Centesimi Italy, 1941	7.66	A later type of Acmonital, a stainless steel similar to AISI 430 (magnetic)
Acmonital-52 note #2 Fe, Cr, Mn, Ni +	50 Kurus Turkey, 1979	7.69	A later type of Acmonital, a stainless steel similar to AISI 430 (magnetic)
Ni	20 Centesimi Italy, 1909	8.6	A coin graded as XF-45, almost no wear A 1922 coin tested to: 8.71.
CuNi	5 cent Nickel United States, 1915-D	8.54	A counterfeit, same diameter, weight, (5.02 grams), possibly a CuNi alloy. Owner said it is a CuNi alloy. Missing the "F" below date.

Sheet3

Composition	Coin Type	Specific Gravity	Comments
Bronze	1 Escudo Portugual, 1979	8.97	A nice reddish/chocolate brown color. Reading is a bit high, not much tin!
Cu plated steel	2 Euro Cents France, 2007	7.92	Edge has a groove, very similar to those seen on the cores of various bi-metallics.
Bronze	2 Thebe Botswana, 1981	8.82	Small 12 sided coin. Weighed 1.72 g..
Brass	25 Sentimo Philippines, 1985	8.35	Typical bright yellow/brassy color.
Brass	20 Euro Cent Finland, 2002	7.79	Reading is on the lower end for brass, suggesting less Cu in the alloy. Bright.
Al	1 Yen (year 47) Japan, 1972	2.73	A good reading for aluminum.
Cu, Sn, Zi	1 Cent Canada, 1972	8.89	Composition: .980 Cu, .005 Sn, .015 Zi. SG of Pure Cu is 8.94 – 8.96
Fe	5 Pfennig Germany, 1915	8	Ingot iron is 7.86, my reading is within limits.
Cu plated steel	1 Cent Canada, 2002 (1952-2002)	8.13	The composition of the last of the cents! Some 2003-2006, were Cu plated Zi A magnet differentiates.

Sheet4

Composition	Coin Type	Specific Gravity	Comments
CuNi	750,000 Lira Turkey, 2002	8.8	A bright white, suggesting a higher amount of Ni than a US nickel.
AgCu	.25 Cent Quarter United States, 2014	10.16	Proof, silver, Great Sand Dunes. The SG suggests only about .800 Ag content! The mint states it is: .900 Ag, .10 Cu.
Mn, Bronze	One dollar United States, 2015-D	8.63	Composition: .770 Cu, .120 Zi, .070 Mn, .040 Ni. Bright yellow/white color.
CuNi	One Peso Mexico, 1974	9.16	Each Mexican Peso showed some minor variations, in strike and weight.
CuNi	One Peso Mexico, 1980	9.05	The "open 8" variety.
Cu, Zi, Ni	One Pound #1 Great Britain, 1985	8.63	.700 Cu, .245 Zi, and .055 Ni
Nickel/Brass	5 Piso Philippines, 2004	8.72	Strong golden/yellow color
CuNi	.25 cents British Honduras, 1964	8.96	A bit high for a CuNi alloy.
Cu,Ni, Nb (Cb)	M.U.L.I.C., medal Franklin Mint, 1967	8.98	Midwestern United Life Insurance medal. 24.42 grams, 38.8 mm. Franklinium II Columbium (Cb) is identical to Niobium

Sheet5

Composition	Coin Type	Specific Gravity	Comments
Nickel/Brass	10 Francs France, 1979	8.48	Coin has a somewhat dull or antique finish, apparently applied via the French Mint.
Nickel/Brass	2 Tolarja Slovenia, 1998	8.49	Typical bright yellow/brassy color.
Cu Zi	5 cents Canada, 1943	8.52	.880 Cu and .120 Zi, known as "Tombac"
steel, plated, 2x	5 cents Canada, 1944	7.76	low carbon steel, plated with .0127" Ni Then .0003" of Cr.. Bluish tinge.
Ag, Cu	2 Piastres Egypt, 1944	9.45	Listed as .500 Ag, but at 9.45 it is closer to being .350 Ag! 6 sided coin.
Cu, Ni, Nb (Cb)	one dollar token Nevada, 1967	8.99	Franklinium II, not magnetic, exotic! Wagon Wheel Casino. Popular in casinos.
Ni, Nb (Cb) (Si?) see note #3	one dollar token Nevada, 1965	8.37	Rare Franklinium I. Is magnetic, Harrah's Casino. SG suggests some lighter metal Al or Mg is alloyed. See Gardiner's Islands issue of 1965 (rare). "Nicon" is Cu, Ni, Cb. However it may contain Silicon, see last page.
Al (+Mg ?)	10 kurus Turkey, 1975	2.57	Slightly lower SG than pure Al, Mg added? Magnesium is often added to Al to strengthen.

Sheet6

Composition	Coin Type	Specific Gravity	Comments
Cu, Zi, Ni	1 pound #2 Great Britain, 1985	8.61	Basically solid brass: .700 Cu, .245 Zi and .055 Ni. Hence a nickel-brass.
Brass	1 Piastre Sudan, 1983	8.27	Bright brassy color, weak strike, this one is a rare doubled die on the reverse.
Cu plated Al	10 Prutot Israel, 1957	2.73	Copper is electroplated over the Al. Layer is quite thin, barely affects the SG reading. (The Al may be an alloy with Mg ??)
CuNi	10 Pesos Chile, 1976	8.63	Big beautiful coin, Lots of depth to strike.
Al	1 Centesimo Chile, 1962	2.74	Appears to be pure Aluminum, big coin.
Al, Mg, Mn	5 Lire Italy, 1950	2.79	An example of the Italian "Italma" alloy. .962 Al, .035 Mg, and .003 Mn
Nickel/Brass	50 Stotinki Bulgaria, 1962	8.19	A bit on the light side for Ni/Brass, color pale, suggesting more zinc in the alloy.
Cu, Al, Zi	10 Forint 1984, Hungary	8.05	.920 Cu, .060 Al, and .020 Zi
Al, Mg	1 Forint 1984, Hungary	2.64	We can see the presence of the Mg lowering the pure Al 2.71 to 2.64. This coin's alloy is: Al .960 and Mg at .040. Right on!!

Sheet7

Composition	Coin Type	Specific Gravity	Comments
Brass	2 Forint 1984, Hungary	8.55	A nice dark yellow. .720 Cu And .280 Zi. This brass alloy can be used to compare other Cu Zi alloy readings. Note the reading for 60/40 Brass on page 1.
Ag (base Cu?)	1 Peso 1962, Mexico	8.93	.100 Ag, remainder may be .90 Cu? Test coin weighed 15.81 grams. My test is inconclusive as base metal is unknown.
Ni plated steel	10 Leva 1943, Bulgaria	7.93	A good reading for this union of metals.
Ag	American Silver Eagle (ASE) 2014, USA	10.54	my reading is a bit high, but this test suggests a possible .9999 Ag! Coin weighed 31.33 grams

NOTE #1

The U.S. Cent is/was composed thusly over the years:

1793-1837 Copper

1837-1857 Bronze (95% copper, 5% tin and zinc)

1857-1864 CuNi; 87.5% copper, 12.5% nickel (also known as NS-12)

1864-1942 Bronze (95% copper, 5% tin and zinc) Weighs ~ 3.11 g. [i.e. ~ 48 grains]

1943 Zinc-coated steel (low carbon steel, zinc coating ~ .001 ", wt. = 42 grains total.)

1944-1946 Brass (95% copper, 5% zinc) From spent cartridges.

1946-1962 Bronze (95% copper, 5% tin and zinc)

1962-1982 Brass (95% copper, 5% zinc: tin removed in 1962. Weighs ~ 3.11 g.)

1982- present 97.5% zinc core, 2.5% copper plating. Weighs ~ 2.5 g.

NOTE #2

Several types of Acmonital exist. The 1939 Italian 50 centesimi is not a magnetic Acmonital, that is, it is austenitic, not ferritic. Many of the latter occurring Acmonital's of Turkey are referred to as "Acmonital-52", they are typically magnetic. Basically two types are known: (1) A standard - Fe .8175 and Cr .1825, which is ferritic. This ratio is similar to the stainless steel known as AISI 430. (2) A more complex alloy is - Fe ~ .800, Cr .160-.180, Si .015, Mg .005, C .014, S .003, and P .003. This alloy is similar to several alloy compositions of AISI 304, thus it is austenitic (non-magnetic). I have read of other elements seen in some of The early alloys which contained molybdenum, nickel and vanadium. As time has proven, Both alloys have withstood the rigors of circulation for decades quite well! A tribute to the metallurgical talents of the Italians (and others) involved in their manufacture. The only weakness may be the hardness of the SS, requiring coins of a low-relief: however I have a 1977, 100 Lira coin which is quite stunning to behold!

NOTE #3

This token is Franklinium I, which is the same metal used in one of the rare Gardiner's Islands issue of 1965. In data attached to the Gardiners set it is stated that Franklinium I is Nickel "impregnated" with Columbium (i.e. Niobium). However the SG reading Of 8.37 suggests another element has been introduced, a light element perhaps magnesium or aluminum. I ran the test 3 times, and in each case cannot possibly read a SG for Nickel or Niobium or any combinations thereof, hence another metal (element) or metals was/were introduced. Another coin in the Gardiner's set was called "Nicon", it consisted of Ni, Cu and Cb.

END NOTE:

All tests were prosecuted via the same method, of using a nylon thread to hold the coin, then dipping the coin in distilled H₂O with a bit of Joy dish detergent to break the surface tension. In some cases the test was done 4 or 5 times to assure accuracy. The scale used, was one which read to hundredths of a gram. Care was given to remove all air bubbles and other contaminants. All coins were free of any debris. My accuracy would probably be to $\pm .05$ gram. I attempted to illustrate as many alloy combinations as I could. I am sure I missed some alloys, and I realize that many more samples could or should have been displayed. Besides the normal value of such specific gravity readings of common coins, these may assist in detecting counterfeits: it is amazing how that the Chinese and others will duplicate such common coins as U. S. Jefferson nickels of dates which are not even of low mintages!

And finally I am again indebted to the earlier work done by a "KurtS" on the [www.coincommunity](http://coincommunity.com/forum/topic.asp?ARCHIVE=true&TOPIC_ID=40733) site. It is odd that his "warnings" went unheeded. Note:
http://coincommunity.com/forum/topic.asp?ARCHIVE=true&TOPIC_ID=40733

NOTE: Nicon was the tradename for Franklinium II, which was nickel with silicon added. (This is per Krause in: Guidebook of Franklin Mint Issues. 1979 edition. Page 81.) However, he makes no comment about any Columbium, except that it is in Franklinium 1. Some confusion seems apparent.

As per my SG tests of these two exotic metal alloys, it is noted that the SG reading of Franklinium 1, was low could it be that it also contained silicon? It would be nice to be able to communicate with any surviving metallurgists from the Franklin Mint!!