Hydrogen to Copernicium: Postage Stamps as Cultural Icons in the IYC

Daniel Rabinovich

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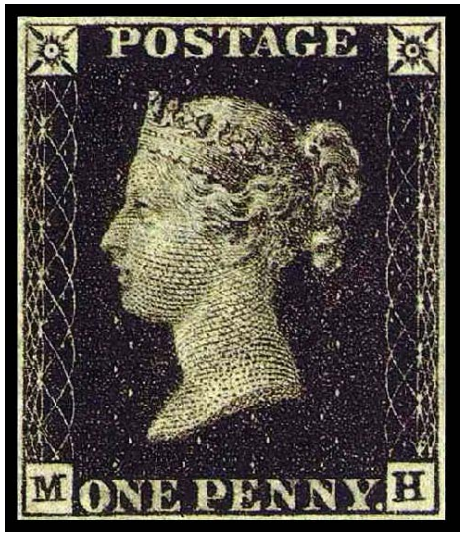
Once upon a time…

- Until the 1830's, letters were paid by the recipient not the sender.

- Sir Rowland Hill, an English teacher, inventor, and social reformer (1795-1879), introduced postage stamps in 1840.

Philately



Penny Black
1840

- From the Greek *phil-* “love” and *ateleia* “exempt from tax”.
- The collecting and study of postage stamps and other postal matter as a hobby or an investment.

Some stamps are issued for fun…

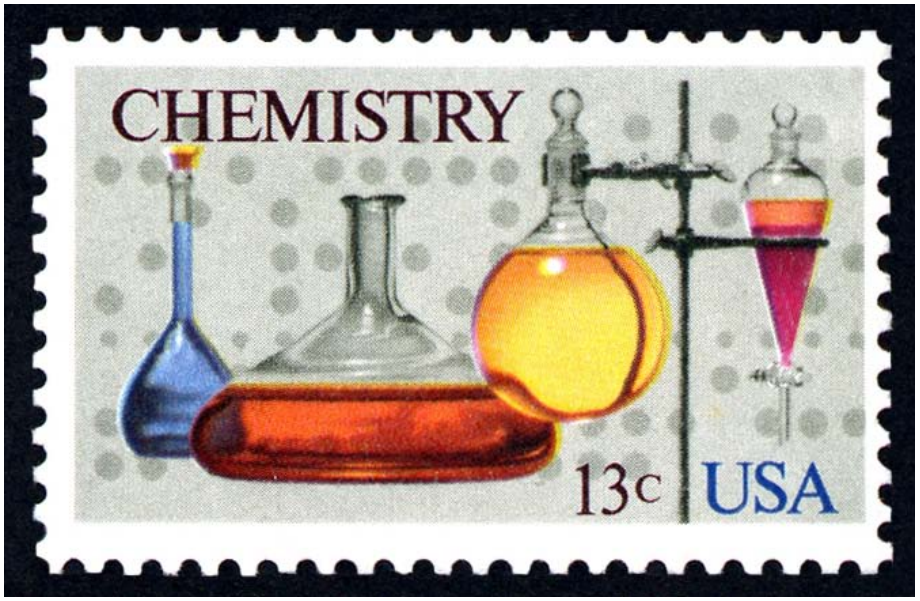
and some are issued for a reason…

- Many stamps have been issued to commemorate events and educate the public: history, art, literature, *science…*

- Attractive way to illustrate oral presentations, papers, etc.
- Inexpensive and effective teaching tools!

Chemistry on Stamps

- *Chemophilately (chemical philately):* the philatelic study of chemistry (Rappoport, Z. *Acc. Chem. Res.* **1992**, *25*, 24-31).



Heilbronner, E.; Miller, F.A. *A Philatelic Ramble through Chemistry*; Wiley-VCH, 1998.

The Tree of Science

Once upon a time…

The Four Classical Elements in Greece

air fire water earth

air fire

earth water

air

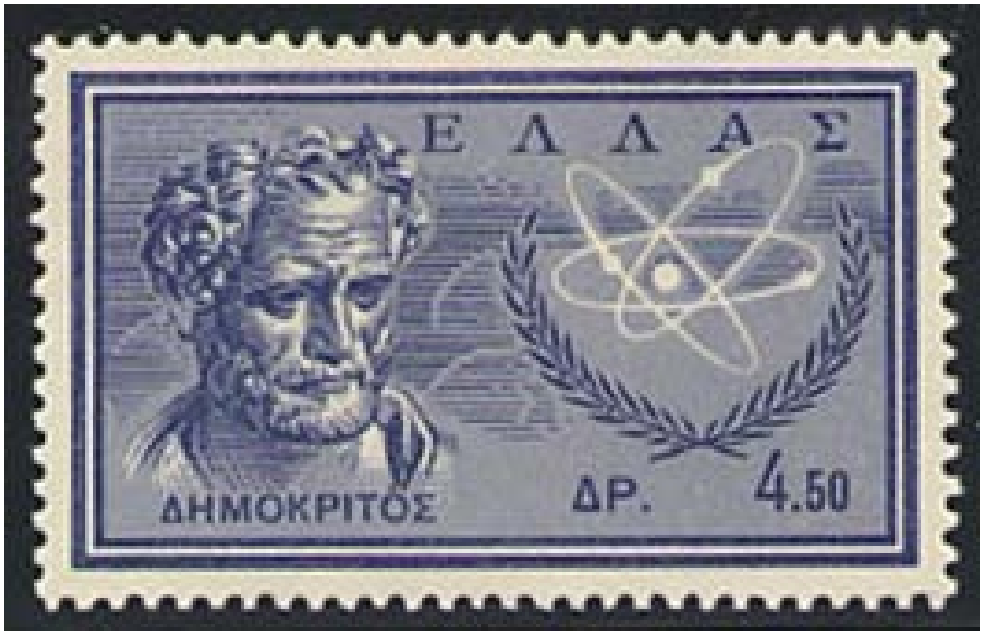
fire

earth

water

Democritus (460-370 BC)

Matter is made up of extremely small, indivisible particles: “atoms”.



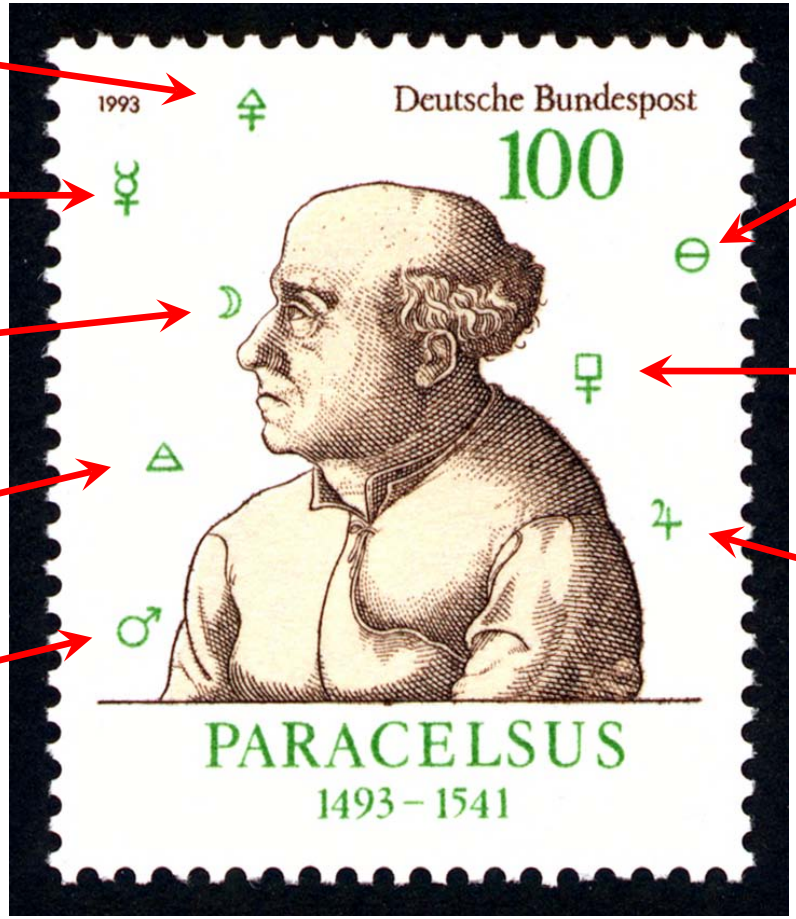
Alchemy in the Middle Ages

Agricola

Theophrastus Philippus Aureolus Bombastus von Hohenheim

Paracelsus

(1493-1541)



S

Hg
Mercury

Ag
Moon

air

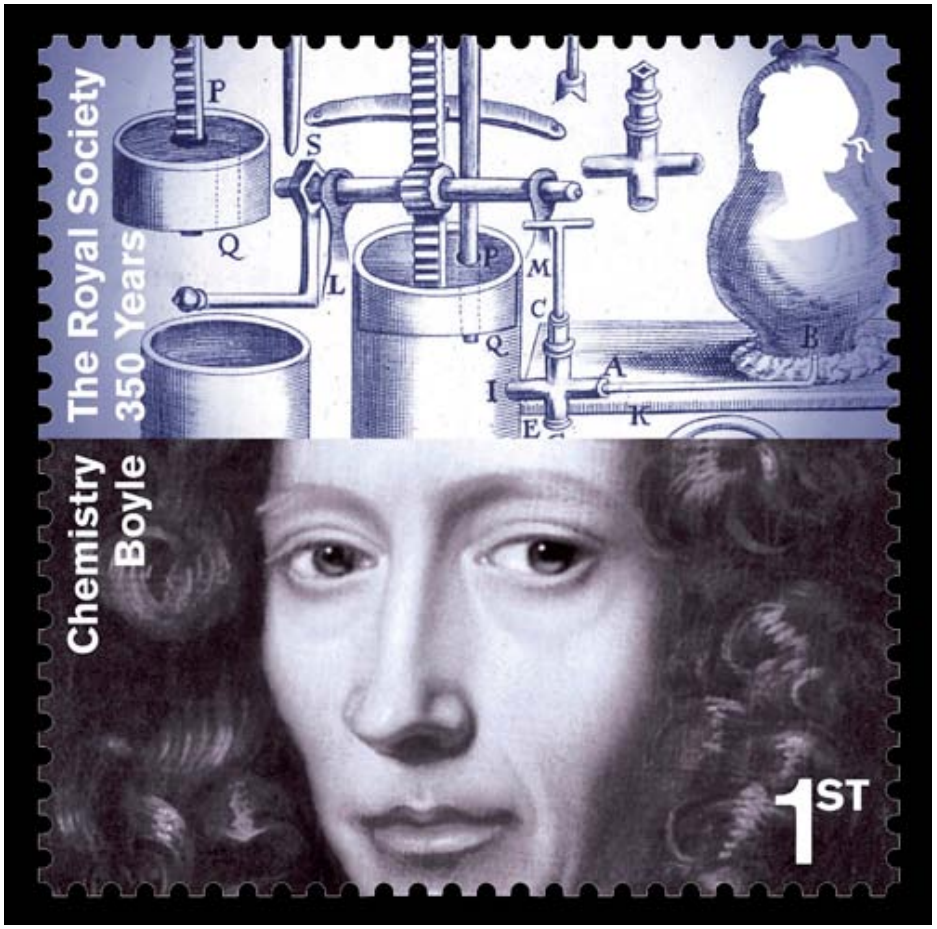
Fe
Mars

salt

potash

Sn
Jupiter

Robert Boyle (1627-1691)

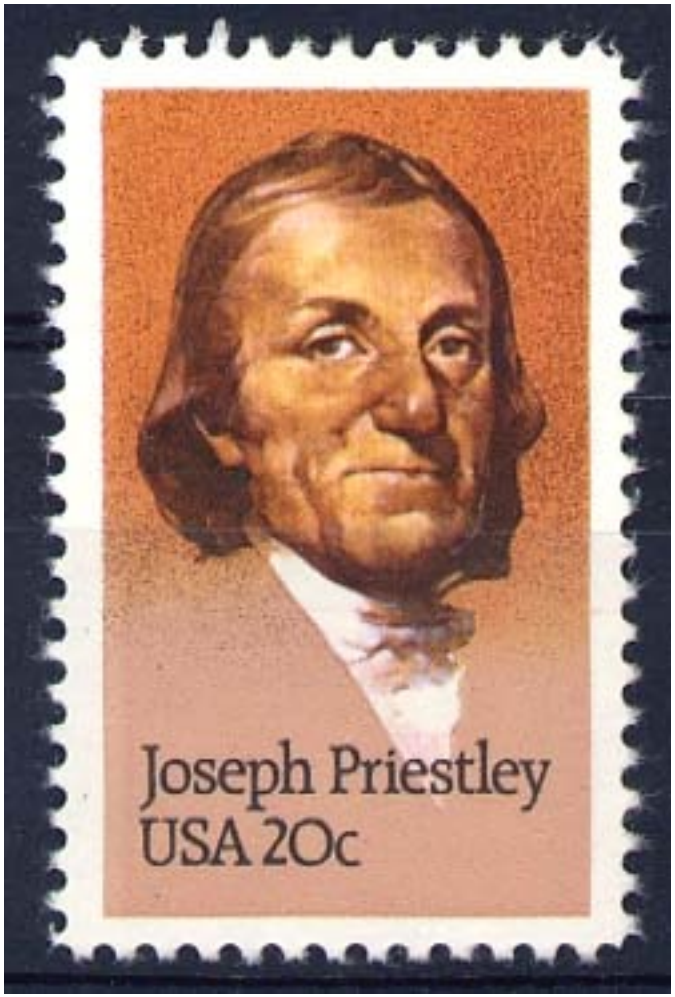


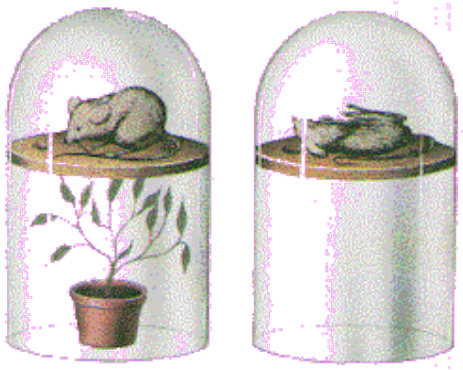
Issued on February 25, 2010: 350th anniversary of the Royal Society.

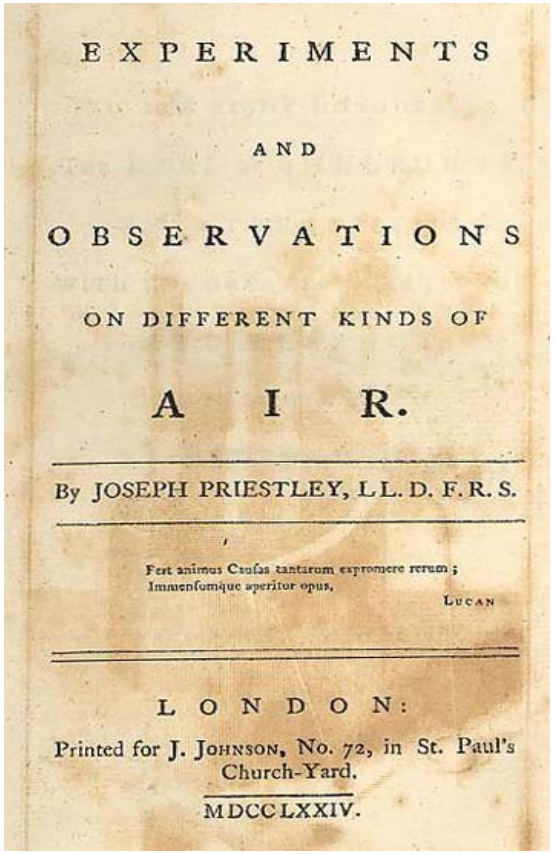
Antoine Lavoisier (1743-1794)

maximum card

Joseph Priestley (1733-1804)







EXPERIMENTS

AND

OBSERVATIONS

ON DIFFERENT KINDS OF

AIR.

By JOSEPH PRIESTLEY, LL.D. F.R.S.

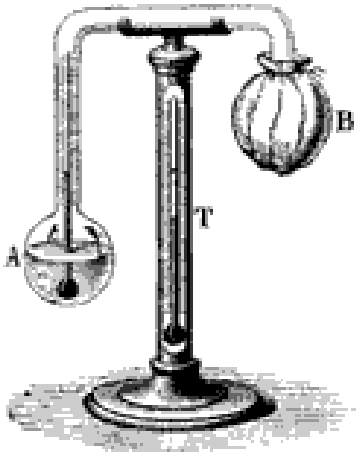
Fert animus Causas tantarum expromere rerum;
Immensumque aperitur opus.
LUCAN

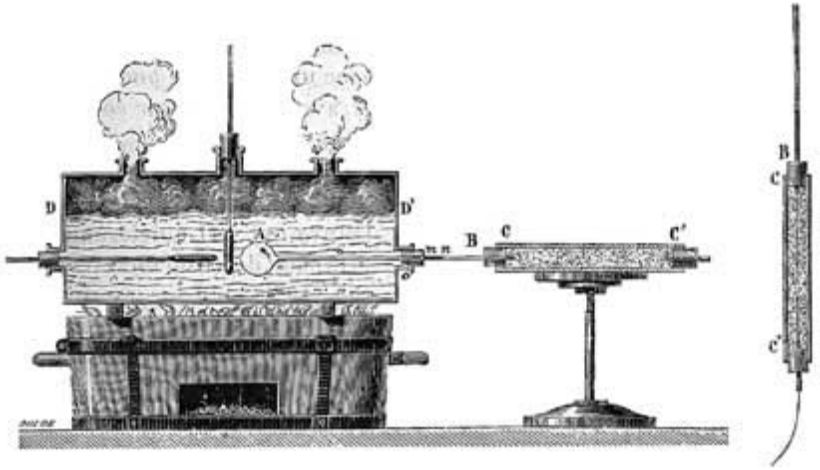
LONDON:

Printed for J. JOHNSON, No. 72, in St. Paul's Church-Yard.

MDCCLXXIV.

Joseph Louis Gay-Lussac (1778-1850)



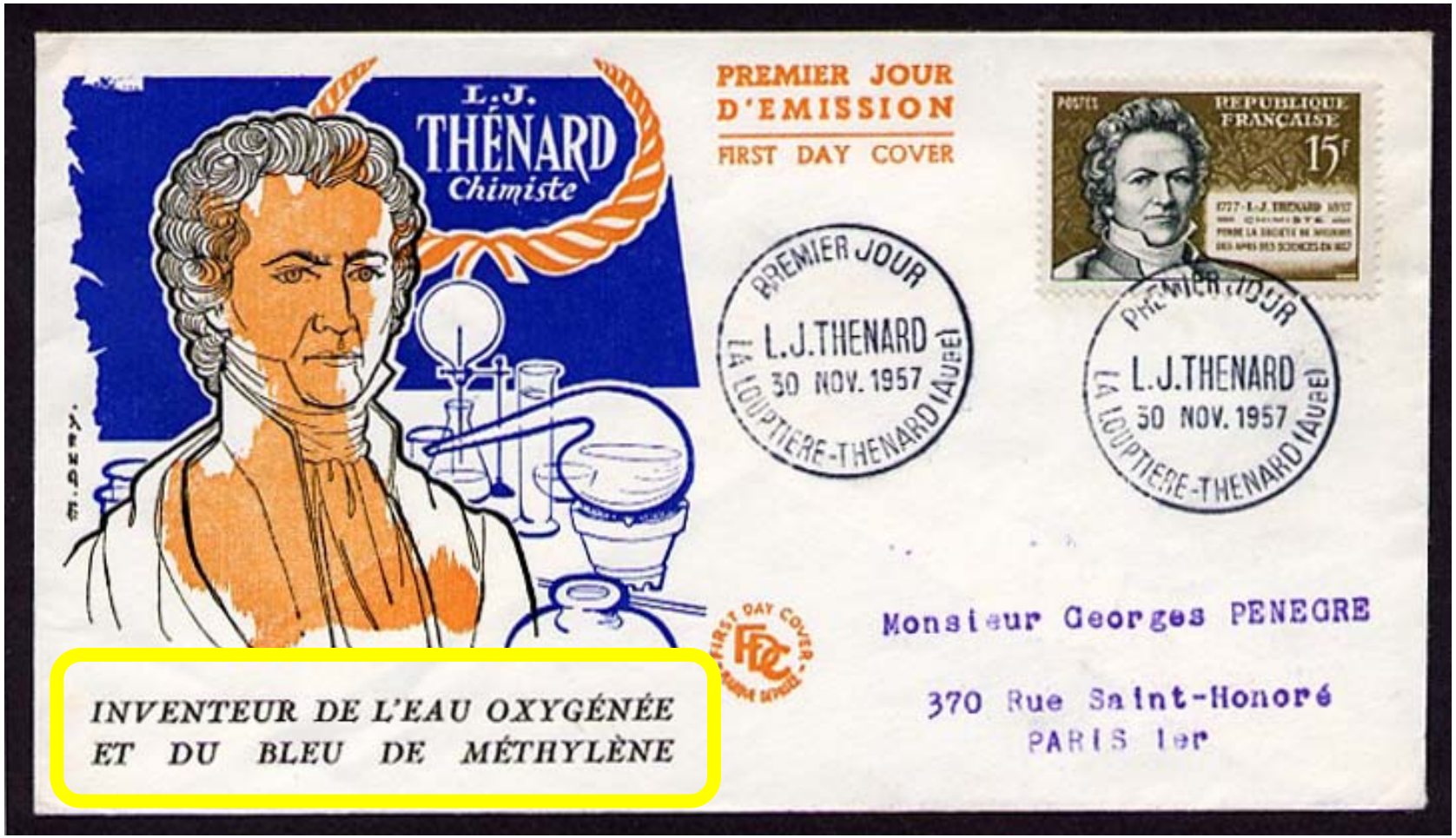


Lorenzo Romano Amedeo Avogadro di Quaregna e Cerreto (1776-1856)

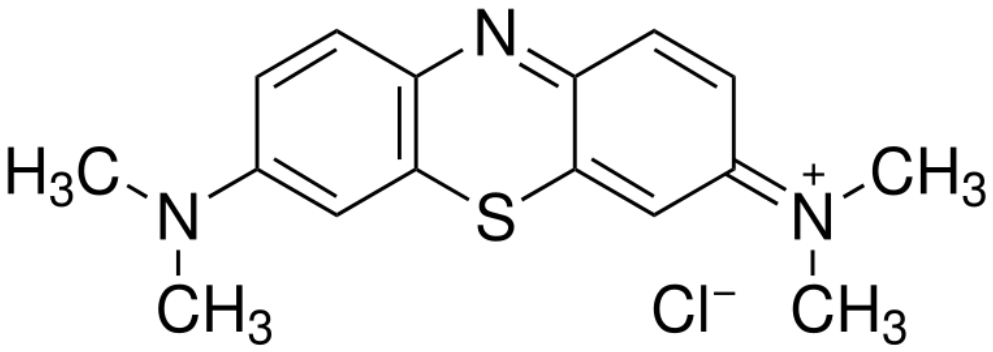
Avogadro's Law: "equal volumes of gases, at the same temperature and pressure, contain the same number of molecules".

$N_A = 6.022 \times 10^{23}$

Louis Jacques Thénard (1777-1857)

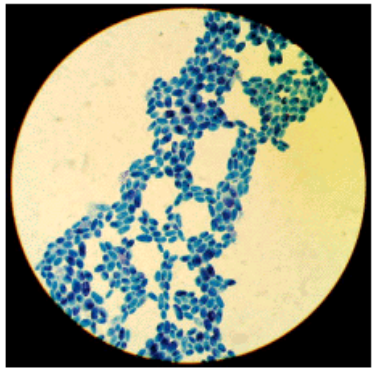


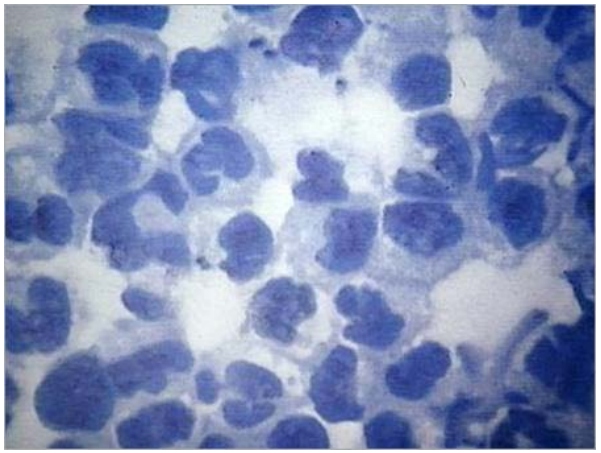
Methylene Blue



$C_{16}H_{18}ClN_3S$

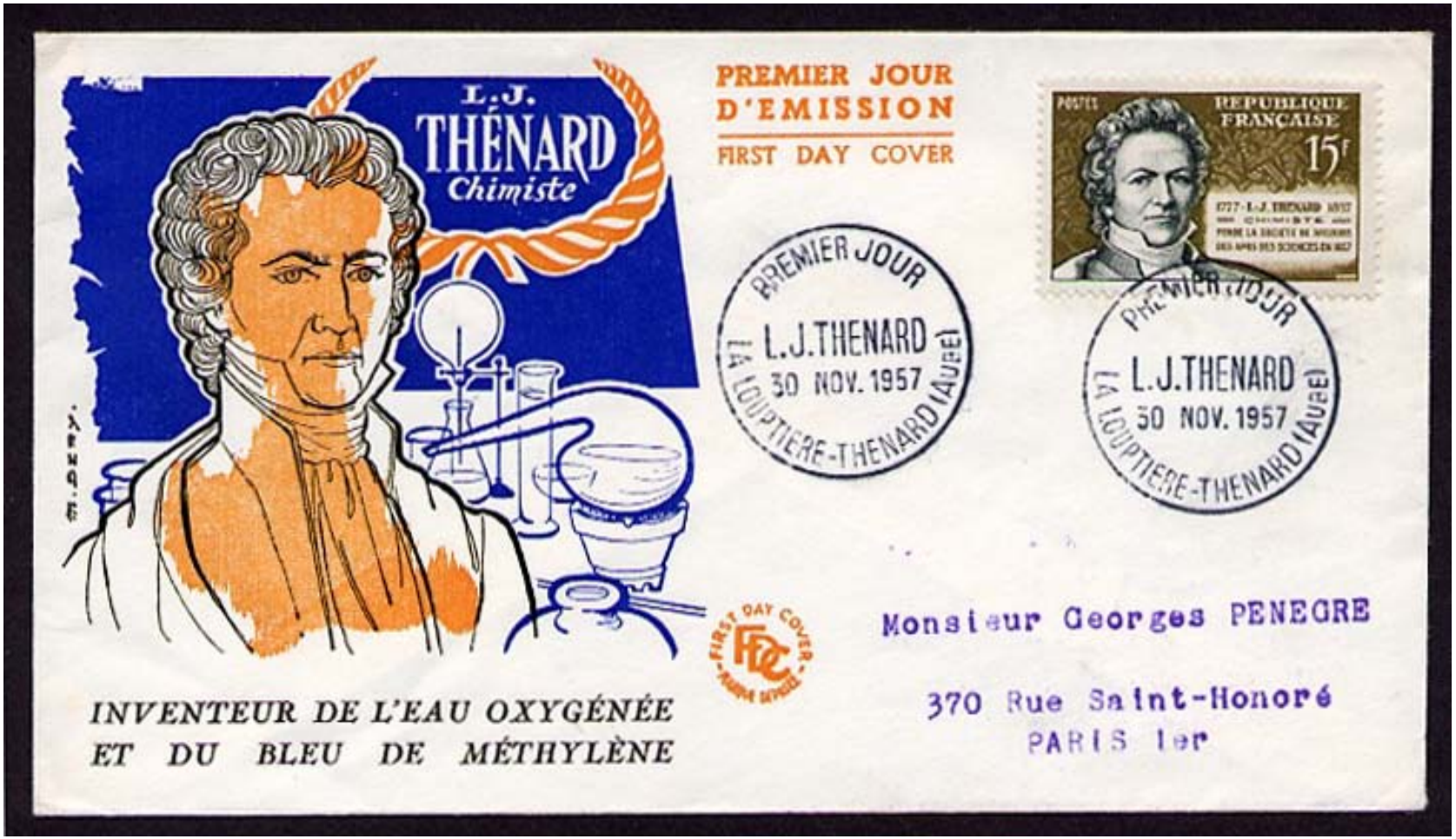
redox indicator





biological stain

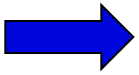
Louis Jacques Thénard (1777-1857)

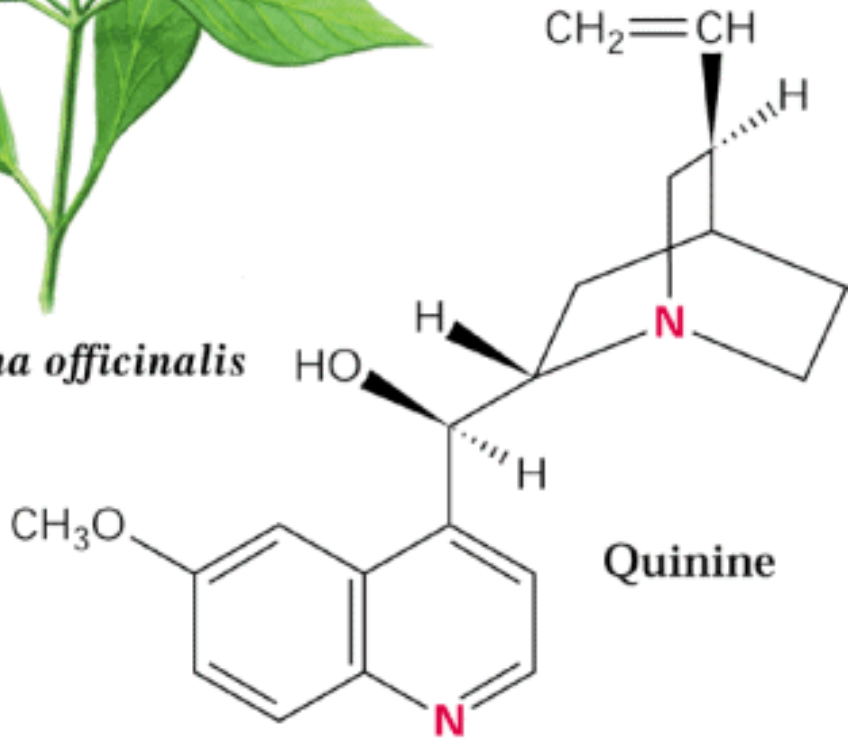


Cobalt blue (Thénard's blue): $CoAl_2O_4$…!

Pelletier & Caventou: the discovery of quinine (1820)

Cinchona officinalis





Quinine

Justus von Liebig (1803-1873)

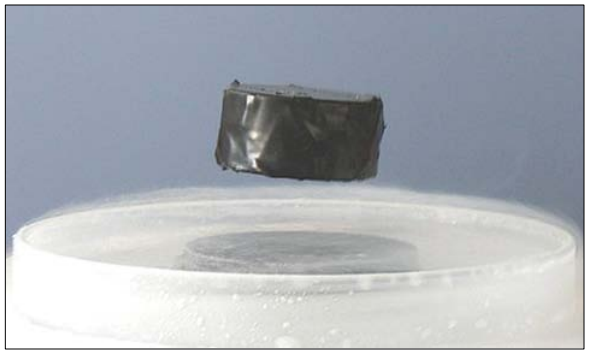
Major contributions to agricultural, biological and organic chemistry.

Justus von Liebig (1803-1873)

Franz-Joseph Müller von Reichenstein (1740-1825)

- Hungarian mineralogist who discovered tellurium (Te) in 1782.

Johan Gadolin
(1760-1852)



$YBa_2Cu_3O_7$

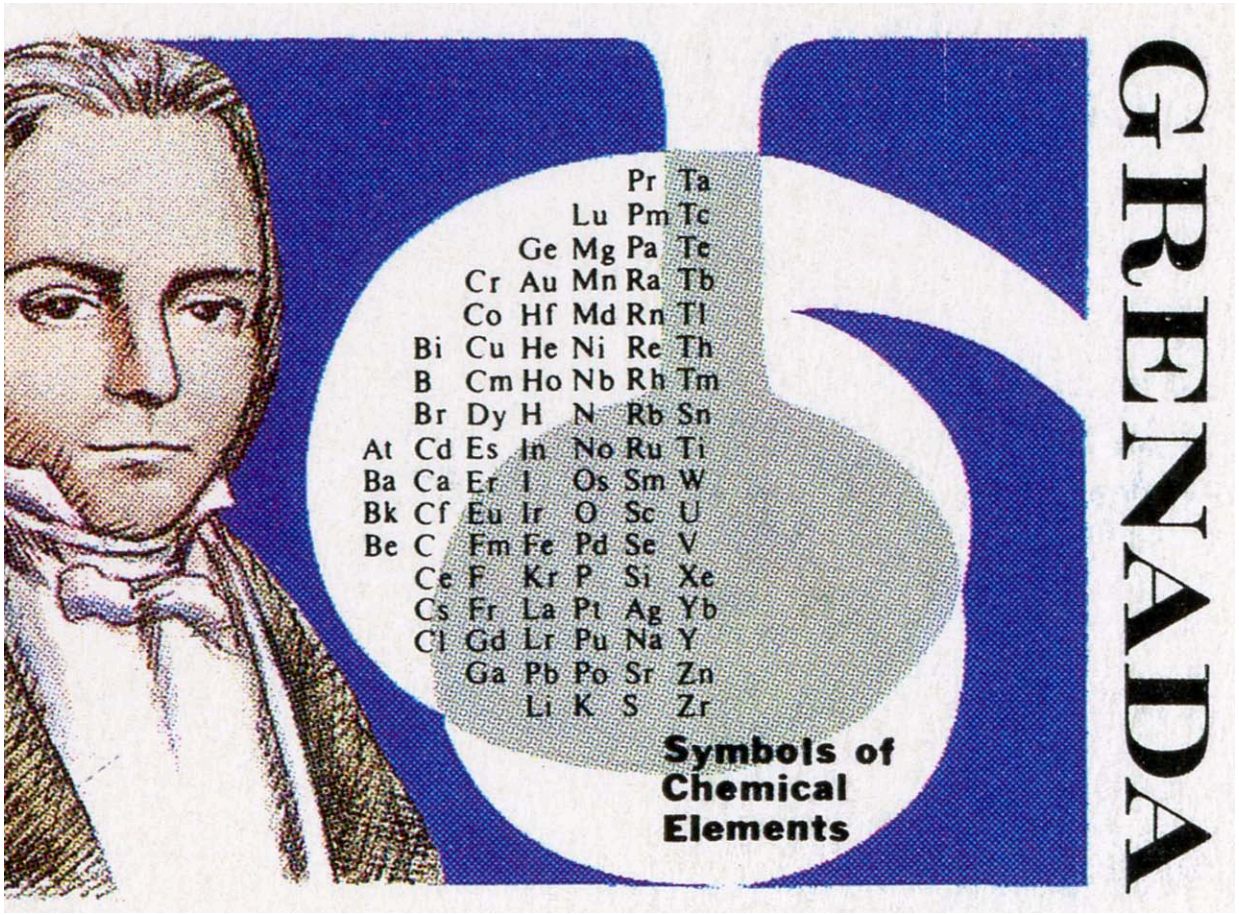
- Founder of Finnish chemistry & discoverer of yttrium (Y) ca. 1794

Jöns Jacob Berzelius (1779-1848)

- Developed a system of symbols for the chemical elements.

Jöns Jacob Berzelius (1779-1848)

- Developed a system of symbols for the chemical elements.



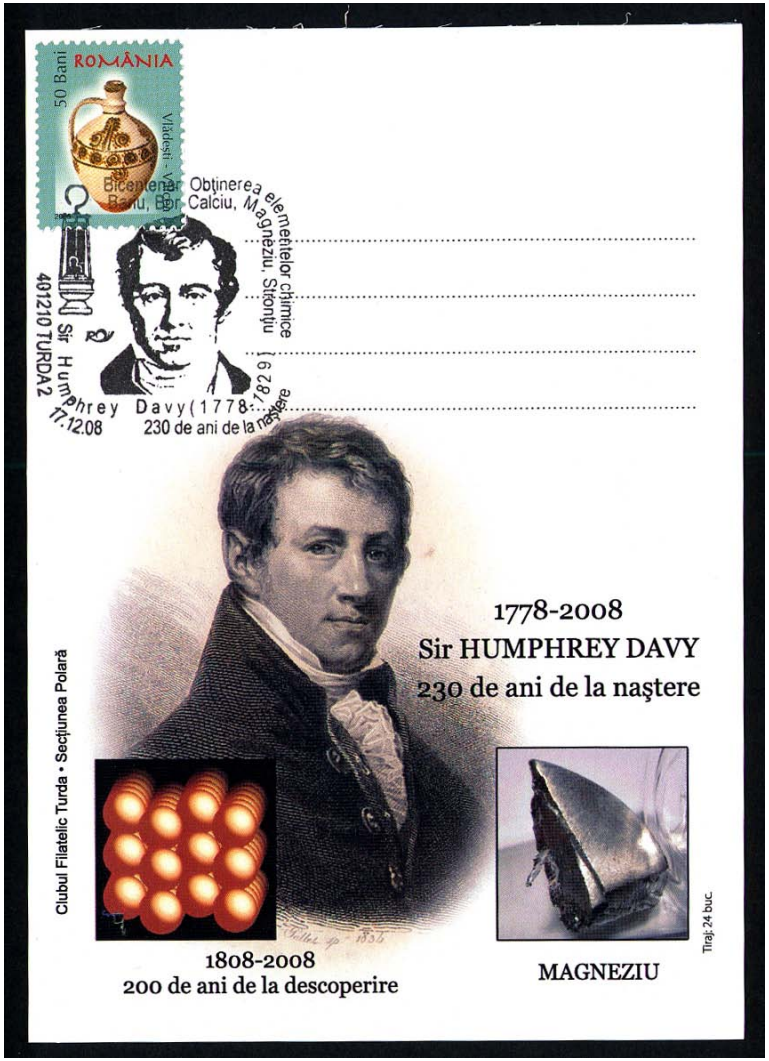
Jöns Jacob Berzelius (1779-1848)

- Coined the terms “catalysis”, “polymer”, “isomer”, and “allotrope”.

Bicentennial of the Karolinska Institute (1810-2010)

- Berzelius also discovered silicon, selenium, thorium, and cerium.

Humphry Davy (1778-1829)



- Discovered Na, K, Mg, Ca & Ba
- Developed miner's lamp

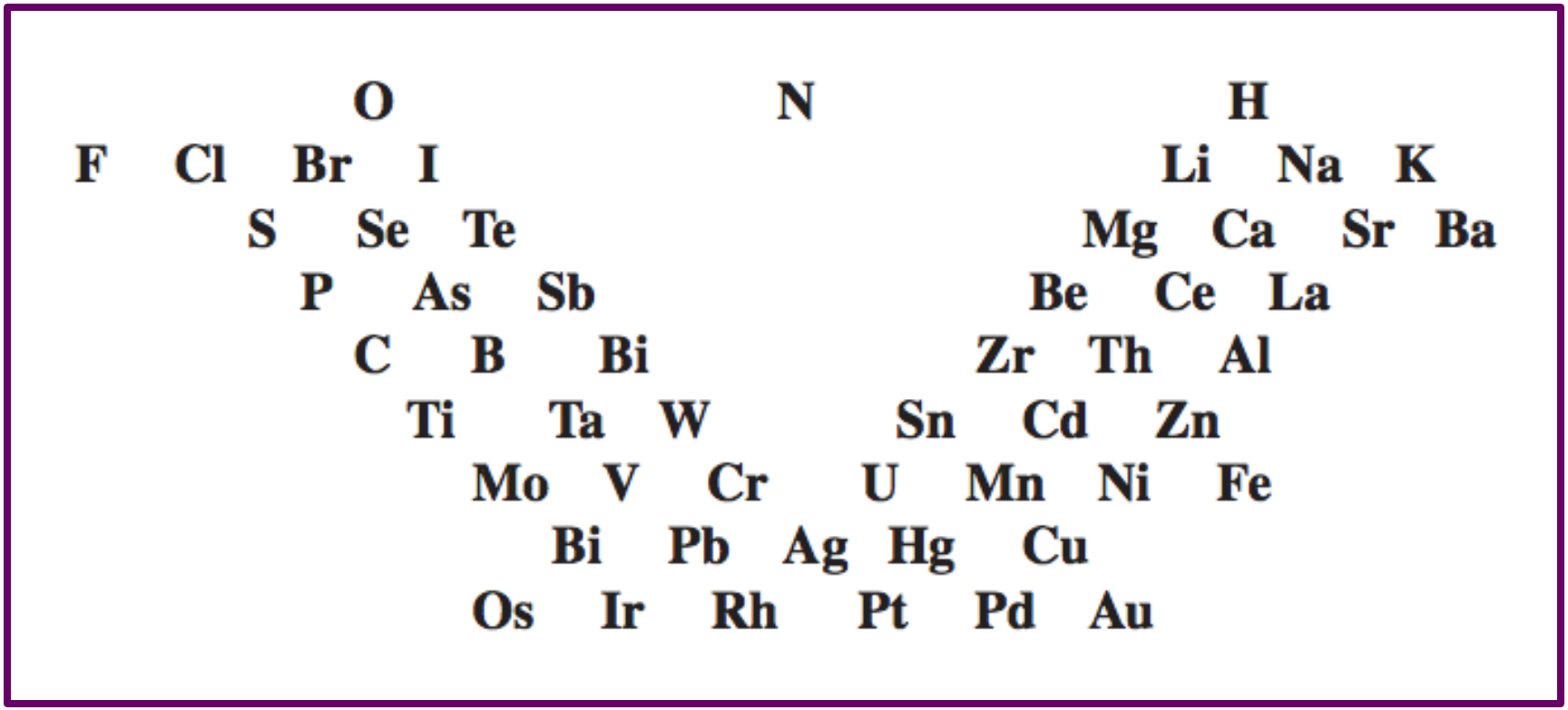
Johann Wolfgang Döbereiner (1780-1849)

Triads, triads everywhere…

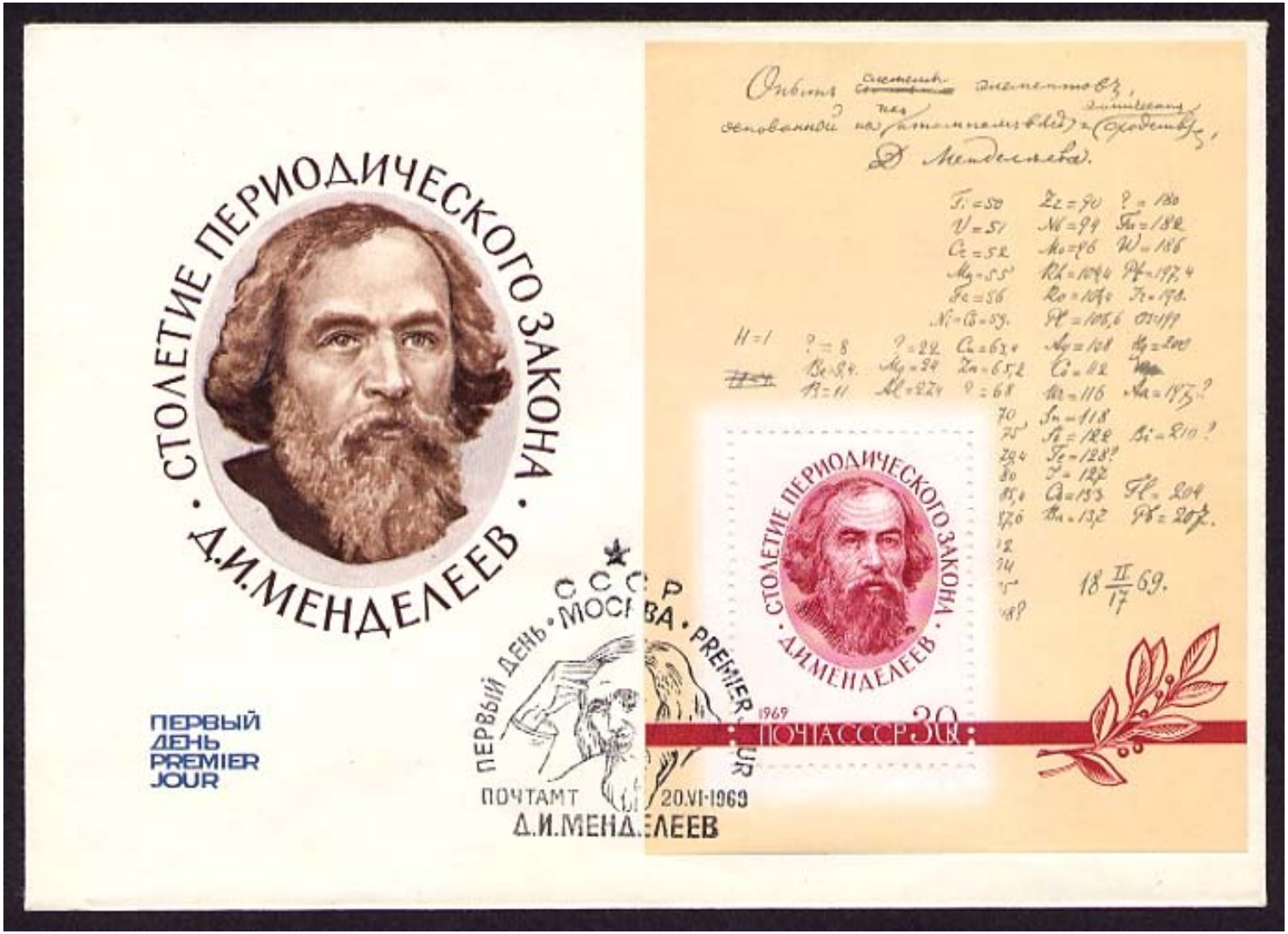
$$Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$$

Leopold Gmelin (1788-1853)

Gmelin's "Periodic Table" (1843)



Dmitri Mendeleev (1834-1907) and the Periodic Table



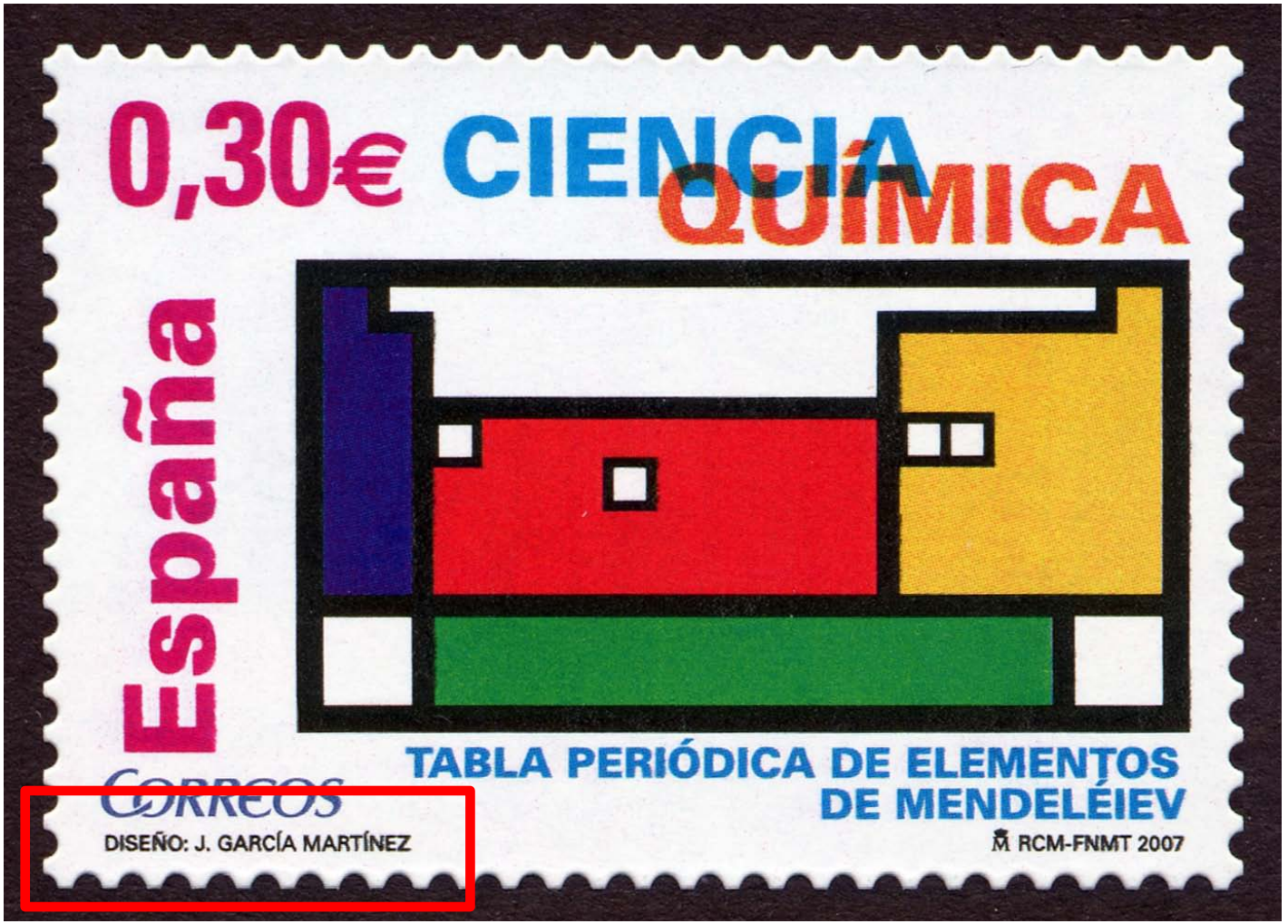
1869 Periodic Table

Ueber die Beziehungen der Eigenschaften zu den Atomgewichten der Elemente. Von D. Mendelejeff. — Ordnet man Elemente nach zunehmenden Atomgewichten in verticale Reihen so, dass die Horizontalreihen analoge Elemente enthalten, wieder nach zunehmendem Atomgewicht geordnet, so erhält man folgende Zusammenstellung, aus der sich einige allgemeinere Folgerungen ableiten lassen.

			Ti = 50	Zr = 90	? = 180	
			V = 51	Nb = 94	Ta = 182	
			Cr = 52	Mo = 96	W = 186	
			Mn = 55	Rh = 104,4	Pt = 197,4	
			Fe = 56	Ru = 104,4	Ir = 198	
			Ni = Co = 59	Pd = 106,6	Os = 199	
H = 1			Cu = 63,4	Ag = 108	Hg = 200	
	Be = 9,4	Mg = 24	Zn = 65,2	Cd = 112		
	B = 11	Al = 27,4	? = 68	Ur = 116	Au = 197?	
	C = 12	Si = 28	? = 70	Sn = 118		
	N = 14	P = 31	As = 75	Sb = 122	Bi = 210?	
	O = 16	S = 32	Se = 79,4	Te = 128?		
	F = 19	Cl = 35,5	Br = 80	J = 127		
Li = 7	Na = 23	K = 39	Rb = 85,4	Cs = 133	Tl = 204	
		Ca = 40	Sr = 87,6	Ba = 137	Pb = 207	
		? = 45	Ce = 92			
		?Er = 56	La = 94			
		?Yt = 60	Di = 95			
		?In = 75,6	Th = 118?			

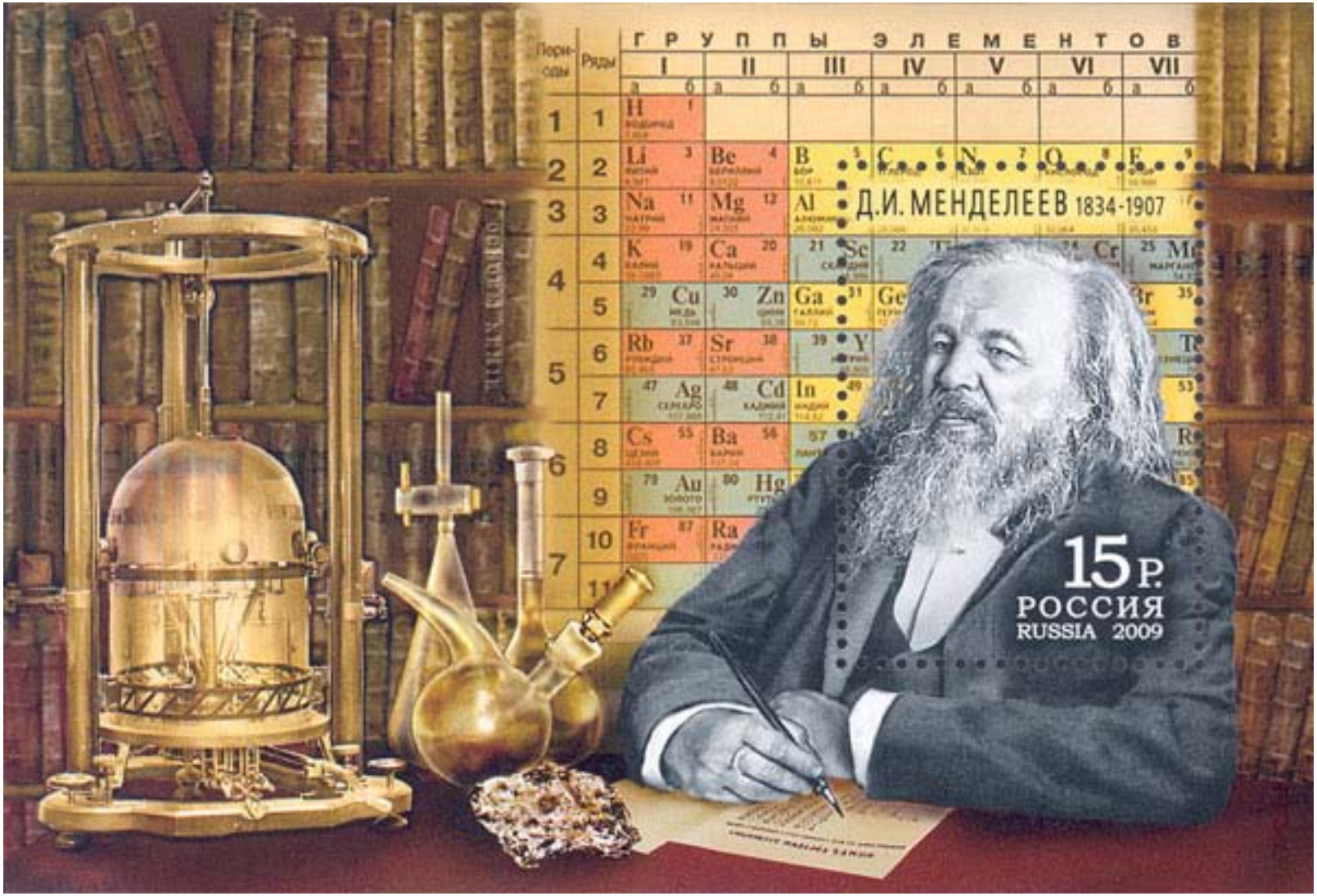
The elements Sc, Ga and Ge were all discovered within a few years…

100th Anniversary of Mendeleev's Death (2007)

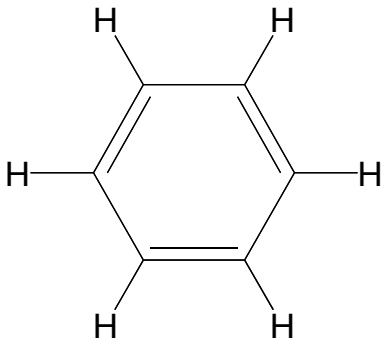


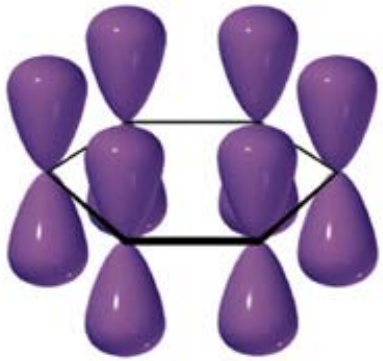
Design: Javier García-Martínez

175th Anniversary of Mendeleev's Birth (February 6, 2009)

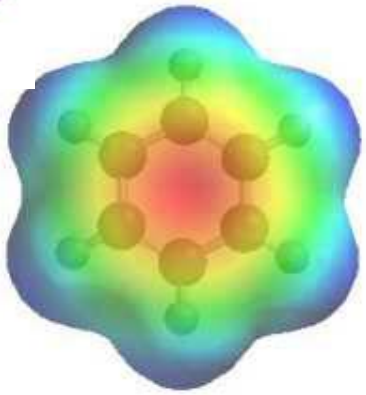


Friedrich August Kekulé (1829-1896)





C_6H_6



Louis Pasteur (1822-1895)


SYRIA
سورية
THE SCIENTIST PASTEUR
18


St Helena
30p


RF
L.PASTEUR
1822-1895
20F
POSTE AERIENNE
TERRITOIRE FRANCAIS DES AFARS ET DES ISSAS


RÉPUBLIQUE DE CÔTE D'IVOIRE
Centenaire de la mort de Louis Pasteur 1895-1995
280F
POSTE 1995


REPUBLIQUE DU CAMEROUN
500F
90e Anniversaire de la Mort de Louis PASTEUR 1895-1985
d'apres EDELFELT - (détail)
POSTE AERIENNE
REPUBLIC OF CAMEROON

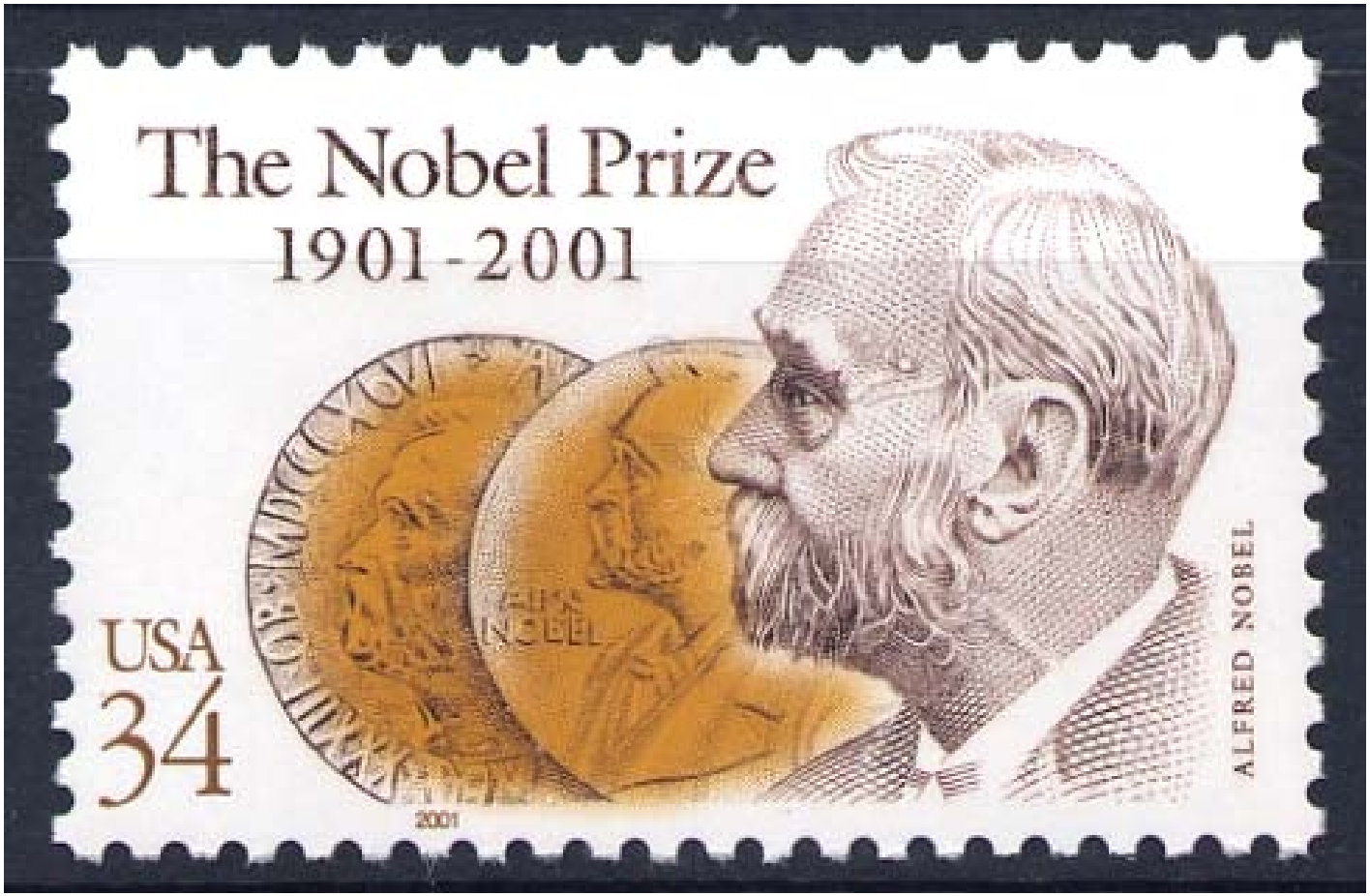

LOUIS
PASTEUR
1822-1895
3,70


REPVBLIQVE FRANÇAISE
30c
PASTEUR
POSTES


REPVBLIQVE FRANÇAISE
45c
PASTEUR
POSTES


REPVBLIQVE FRANÇAISE
50c
PASTEUR
POSTES

Alfred Nobel (1833-1896)




HELVETIA
110
Alfred Nobel


SVERIGE
7KR
Alfred Nobel
C F REUTERSWARD
1997
CZ SLANIA ac


D'ALFRED NOBEL
1833-1896
75e ANNIVRE MORT
POSTE AERIENNE 1971
100F
république du sénégal


Kỷ niệm 100 năm giải thưởng Nô-ben đầu tiên
400đ
BƯU CHÍNH
1901
2001
Việt Nam
ALFRED NOBEL (1833-1896)


SENEGAL
95e Anniversaire de la Mort d'Alfred NOBEL
1896-1991
145F
POSTES

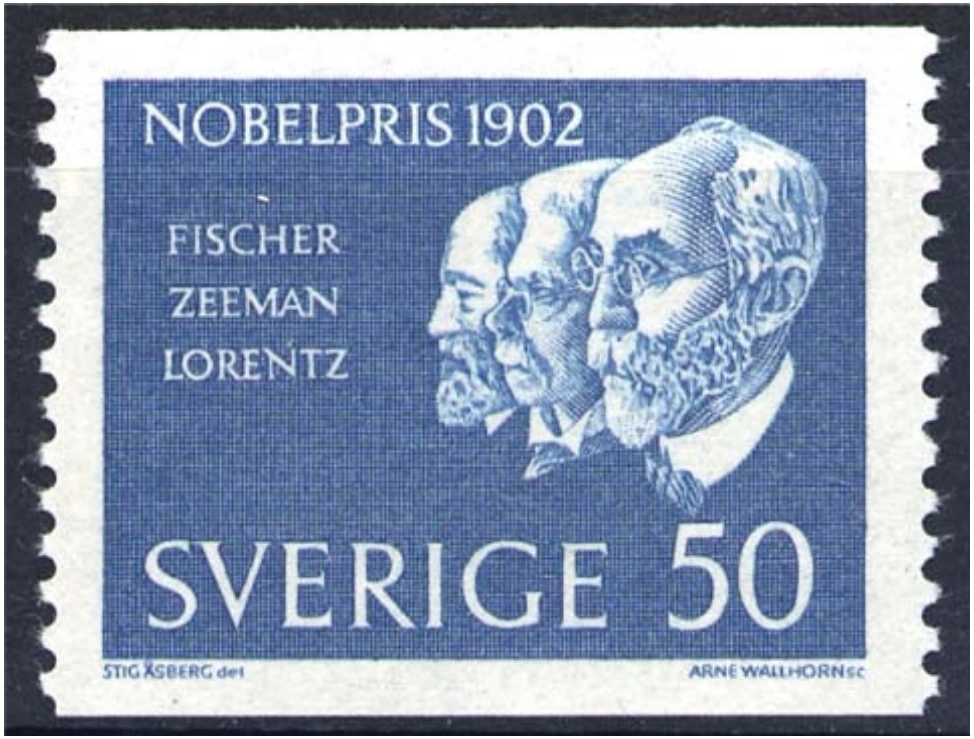

Alfred Nobel invents dynamite 1867
MILLENNIUM
2000
UGANDA 300/-

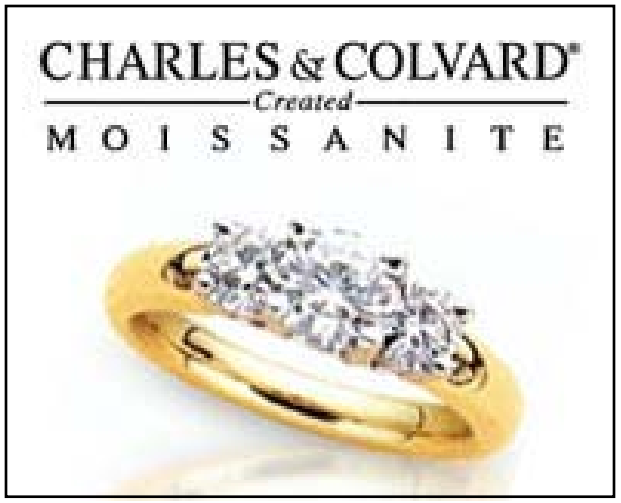

REPUBLIQUE DU MALI
300F
POSTE AERIENNE
ALFRED NOBEL 1833.1896


MONACO
5,00 F
0,76 €
1901-2001 Centenaire des Prix Nobel
A.Nobel
Physique
Chimie
Médecine
Littérature
Paix

Emil Fischer (1852-1919)

"…for his work on sugar and purine syntheses"

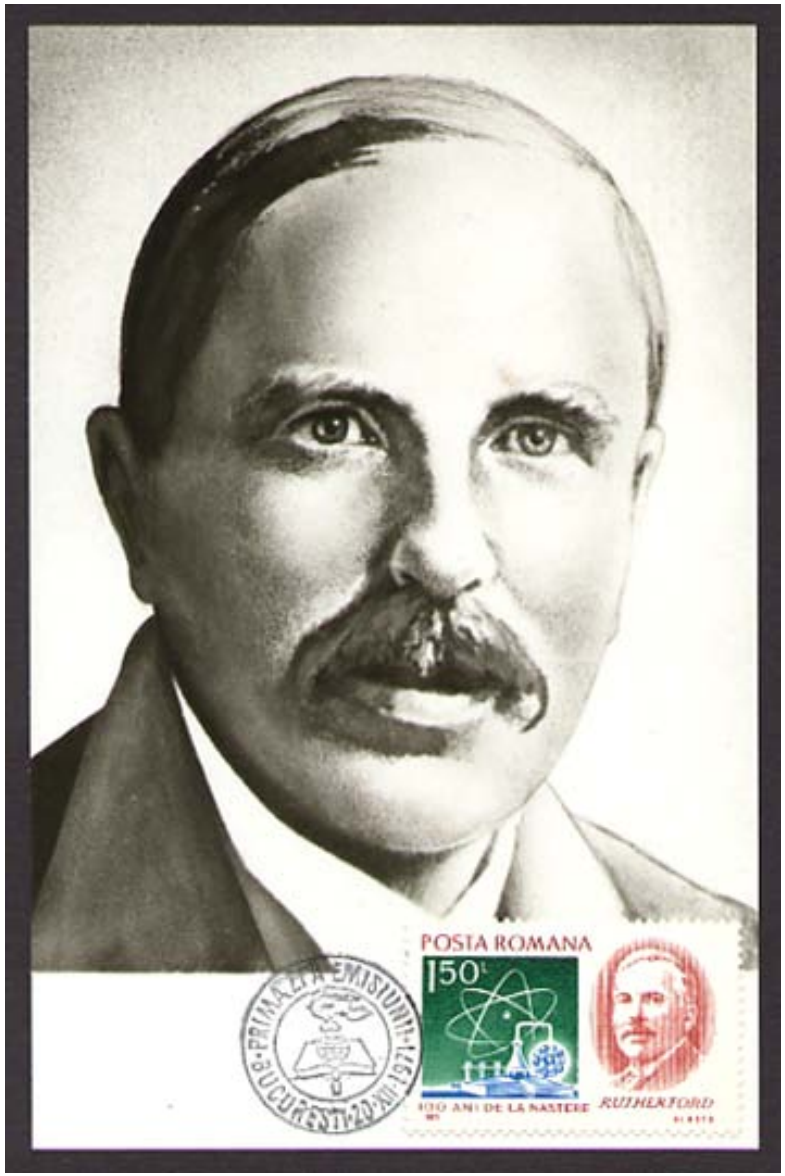




Henri Moissan (1852-1907)

$H_2 + F_2 \rightarrow 2HF$

"…for his… isolation of the element fluorine… and his work on the electric furnace named after him"



Ernest Rutherford (1871-1937)

(Chemistry, 1908)

"The only science is physics.
All the rest is stamp collecting."

Marie Curie (1867-1934)

[Physics, 1903 & Chemistry, 1911]


FIGURA TE SHQUARA BOTERORE
REPUBLIQUE
100F
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CENTRAFRICAINE
CURIE 1867 - 1934
50 Krs + Krs 50
XII^me CONGRÈS SUFFRAGISTE
INTERNATIONAL ISTANBUL 1935
M. CURIE-SKŁODOWSKA
PRIX NOBEL SCIENCES
TÜRKIYE CÜ
COURVOISIER
REPUBLIQUE DE DJIBOUTI
جمهورية جيبوتى
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MARIE CURIE
1867-1934 Polish
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Maria Sklodowska-Curie 1867-193
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MARIE SKLODOWSKA
1867 - 1934
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SURINAME
Nobelprijs Chemie 1911
Marie Curie
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MARIE S. CURIE 1867-1934
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SAN MARINO
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I.P.Z.S. 1982
A. TITONEL
135F
2009
Marie Curie
Republique du Benin
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1867-1967 MARIE SKLODOWSKA-CURIE
SURINAME
MARYA CURIE
1867
1934
KANKER BESTRIJDING
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TÜRKIYE CUMHURIYETI
MARIE CURIE
AVRUPA VE KEŞIFLER
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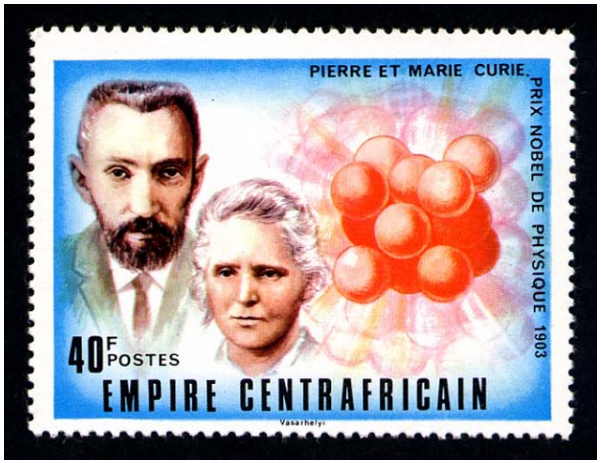
LIRA POSTA
AJANS - TÜRK A.Ş. / Ankara
1994

Marie and Pierre Curie



Irène and Frédéric Joliot-Curie

Nobel Prize in Chemistry (1935)

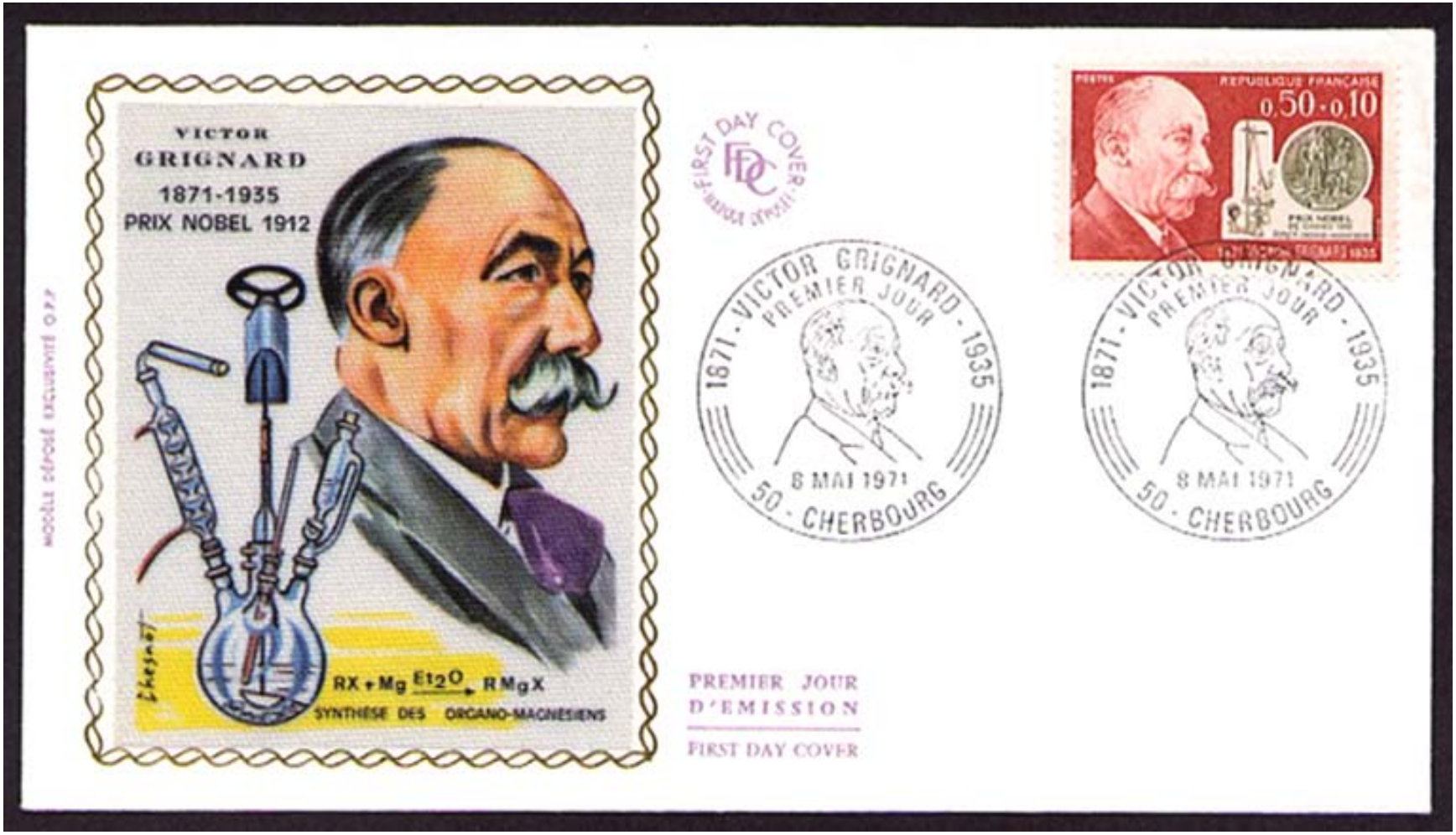
"for their synthesis of new radioactive elements"

Pierre Joliot
(1932–)

Hélène Langevin-Joliot
(1927–)

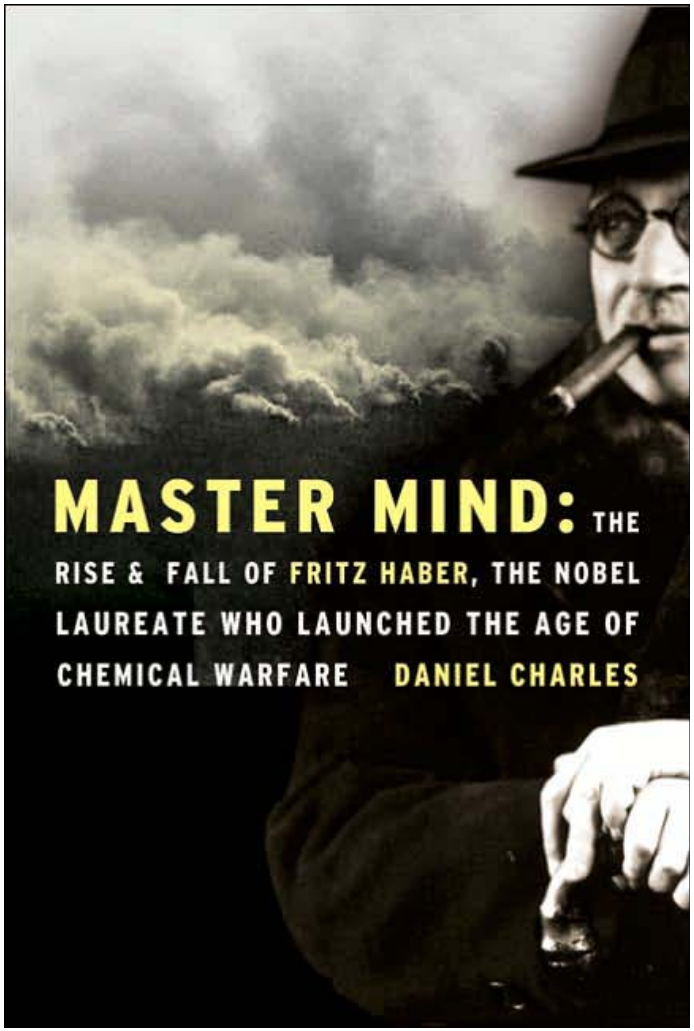
Courtesy: Prof. Jean-Pierre Vairon (UPMC)

Victor Grignard (1871-1935)



$$RX + Mg \xrightarrow{Et_2O} RMgX$$

Fritz Haber (1868-1934)

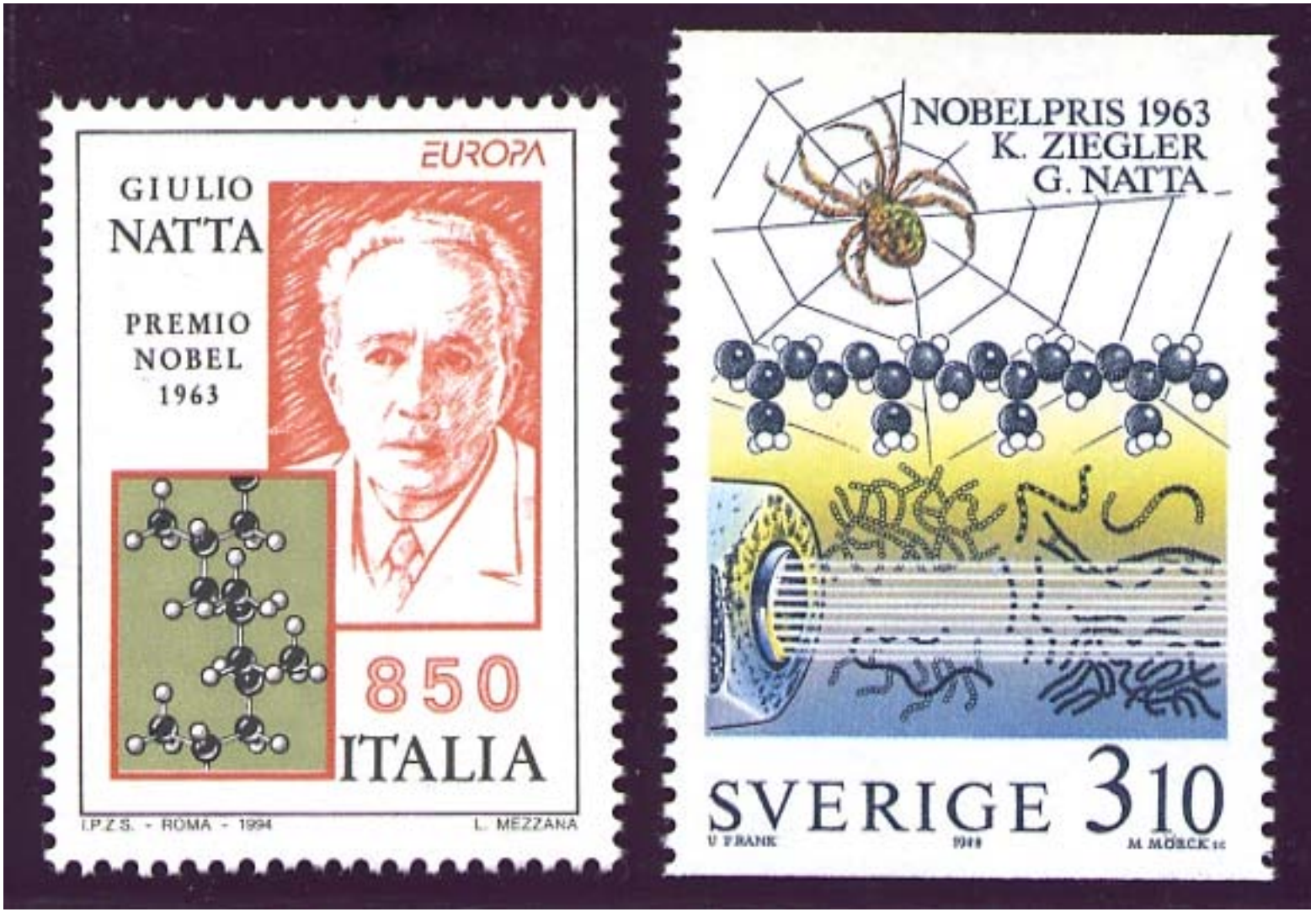


Otto Hahn (1868-1934)

Chemistry (1944): discovery of nuclear fission

Lise Meitner (1878-1968)

Karl Ziegler (1898-1973) & Giulio Natta (1903-1979)



Dorothy Crowfoot Hodgkin (1910-1994)

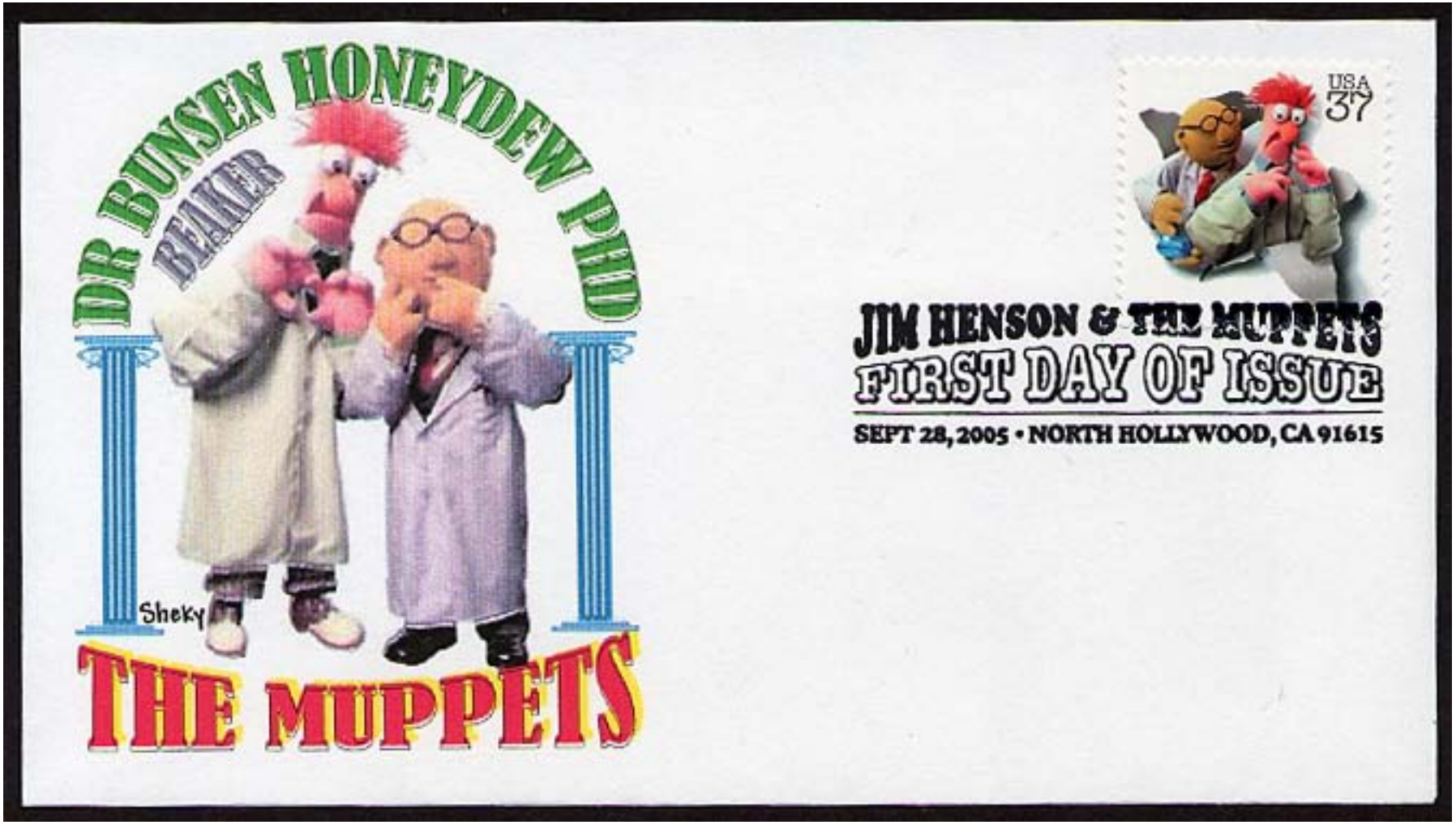
Chemistry Nobel ‘64

Issued on 25 February 2010: 350th anniversary of the Royal Society.

Mario J. Molina (1943–)

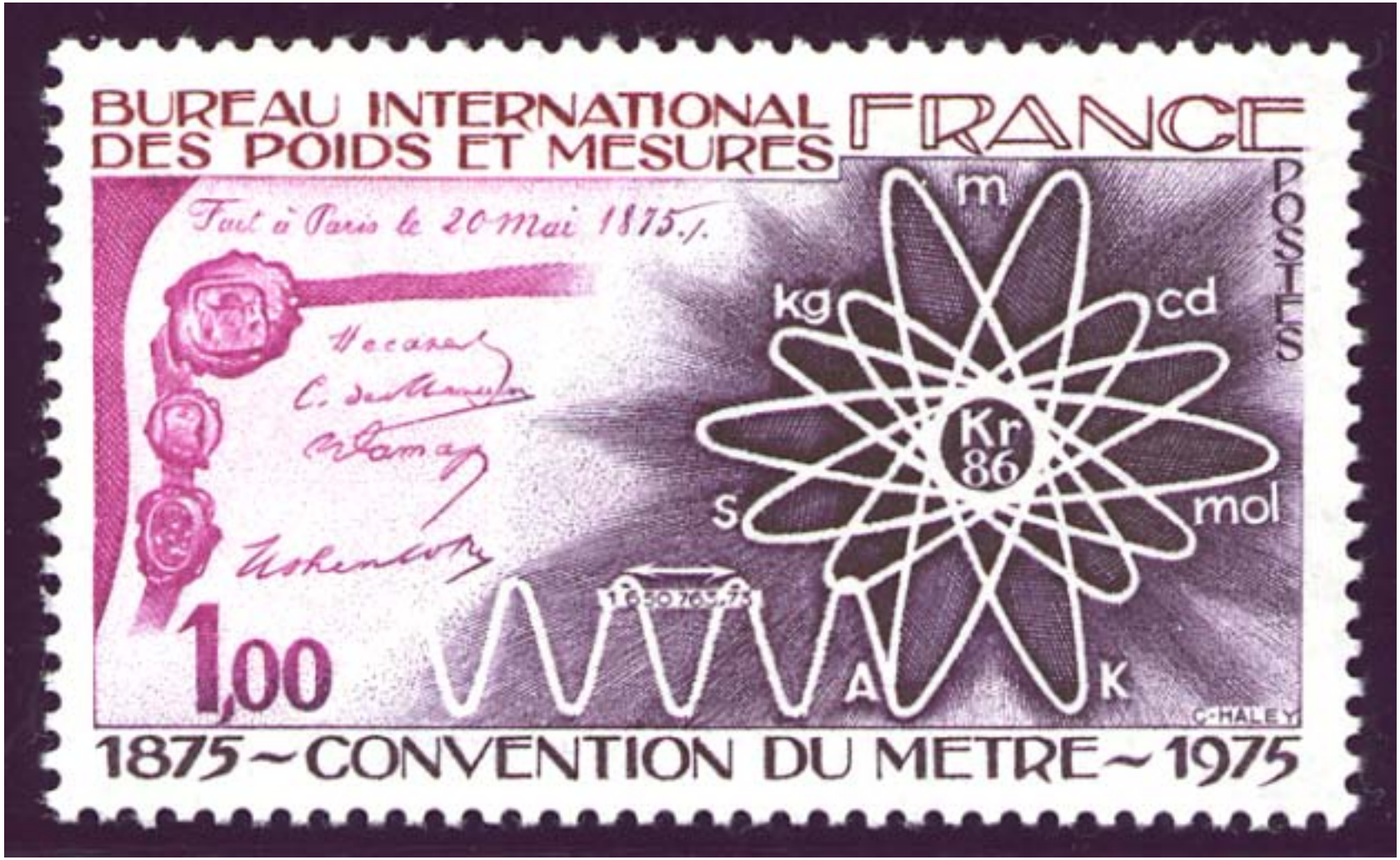
1995 Nobel Prize in Chemistry “for his work in atmospheric chemistry, particularly the formation and decomposition of ozone”

Dr. Bunsen Honeydew and Beaker



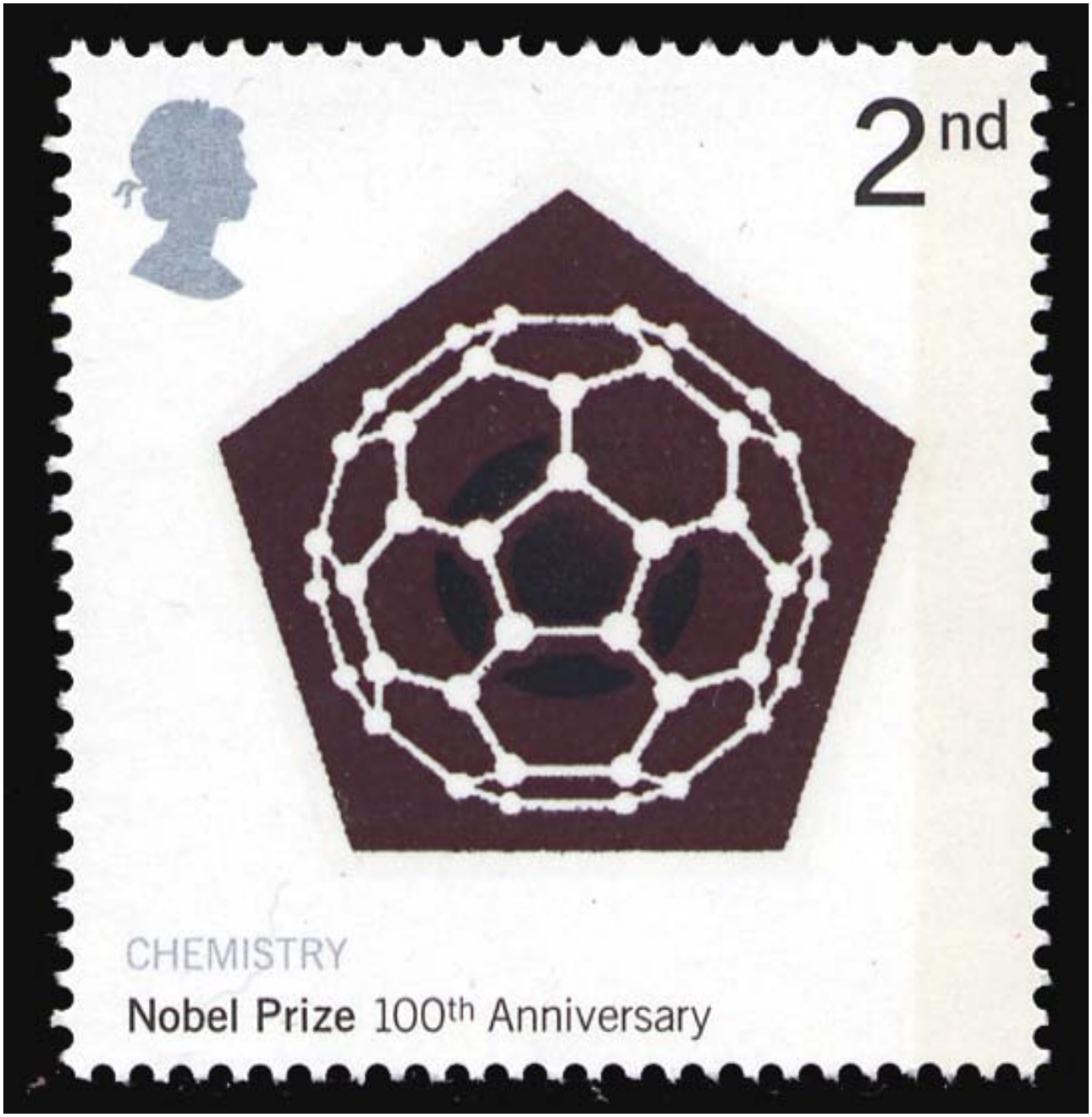
Atoms, molecules, minerals…

Atoms & Nuclear Energy


BUREAU INTERNATIONAL
DES POIDS ET MESURES
FRANCE
POSTES
Fait à Paris le 20 Mai 1875.
m
kg
cd
Kr
86
s
mol
A
K
1,00
C. HALEY
1875 ~ CONVENTION DU METRE ~ 1975


13p
ELECTRICITY

Elements & Minerals


2nd
CHEMISTRY
Nobel Prize 100th Anniversary


Tristan Da Cunha
10p
SULPHUR


SLOVENIJA
Cinabarit Idrija
80
Hg
M. UČAKAR - M. UDOVČ
1999
DELO - TISKARNA


Minerals USA
29
Copper


PILIPINAS
P7
NATIVE COPPER
2009


EUROPA 1983
Cu
COPPER INGOT. ENKOMI
1400-1250 B.C.
BRONZE JUG
ROMAN PERIOD 2nd CENT. A.D.
ΚΥΠΡΟΣ · KIBRIS · CYPRUS 200


1975
CORREOS
NIQUEL
CUBA
MINERALES CUBANOS
3

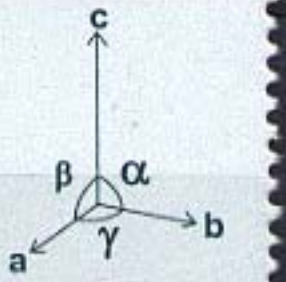

CANADA
GOLD/OR
Au
42


ZAÏRE 2K
MALACHITE
1983 COURVOISIER
ZAÏRE 6Z
DIOPTASE
1983 COURVOISIER
ZAÏRE 8Z
CUPRITE
1983 COURVOISIER
ZAÏRE 1.50Z
BOURNONITE
1983 COURVOISIER
ZAÏRE 45K
QUARTZ
1983 COURVOISIER
ZAÏRE 1Z
URANIUM ET PECHBLENDE
1983 COURVOISIER
ZAÏRE 3Z
CASSITERITE
1983 COURVOISIER

stibnite cinnabar wolframite

Sb_2S_3 HgS $(Fe,Mn)WO_4$

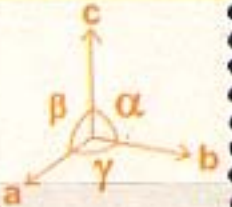
PERÚ S/. 1.80



a = b ≠ c
α = β = γ = 90°

CALCOPIRITA 2001 $CuFeS_2$

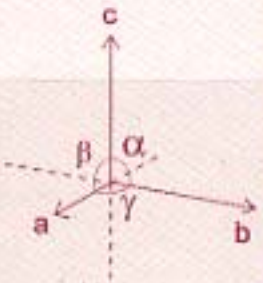
PERÚ S/. 3.20



a = b = c
α = β = γ = 90°

ESFALERITA 2001 ZnS

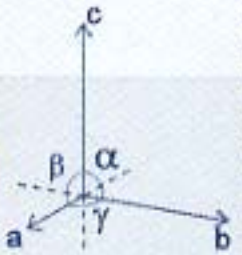
PERU S/. 2.70



a = b = c
α = β = γ = 90°

GALENA PbS

PERU S/. 3.30



a = b ≠ c
α = β = γ = 90°

SCHEELITA CaWO4

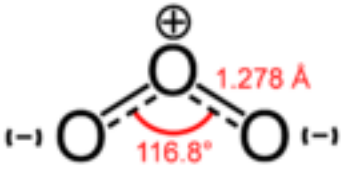
Aluminum and Bauxite on Stamps…

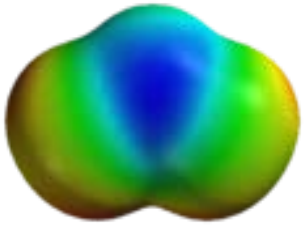

SIERRA LEONE
Le 16
© DISNEY
MICKEY MINING BAUXITE

Chemical Symbols & Formulas

International Union of Pure and Applied Chemistry
20th Congress: Moscow, 1965

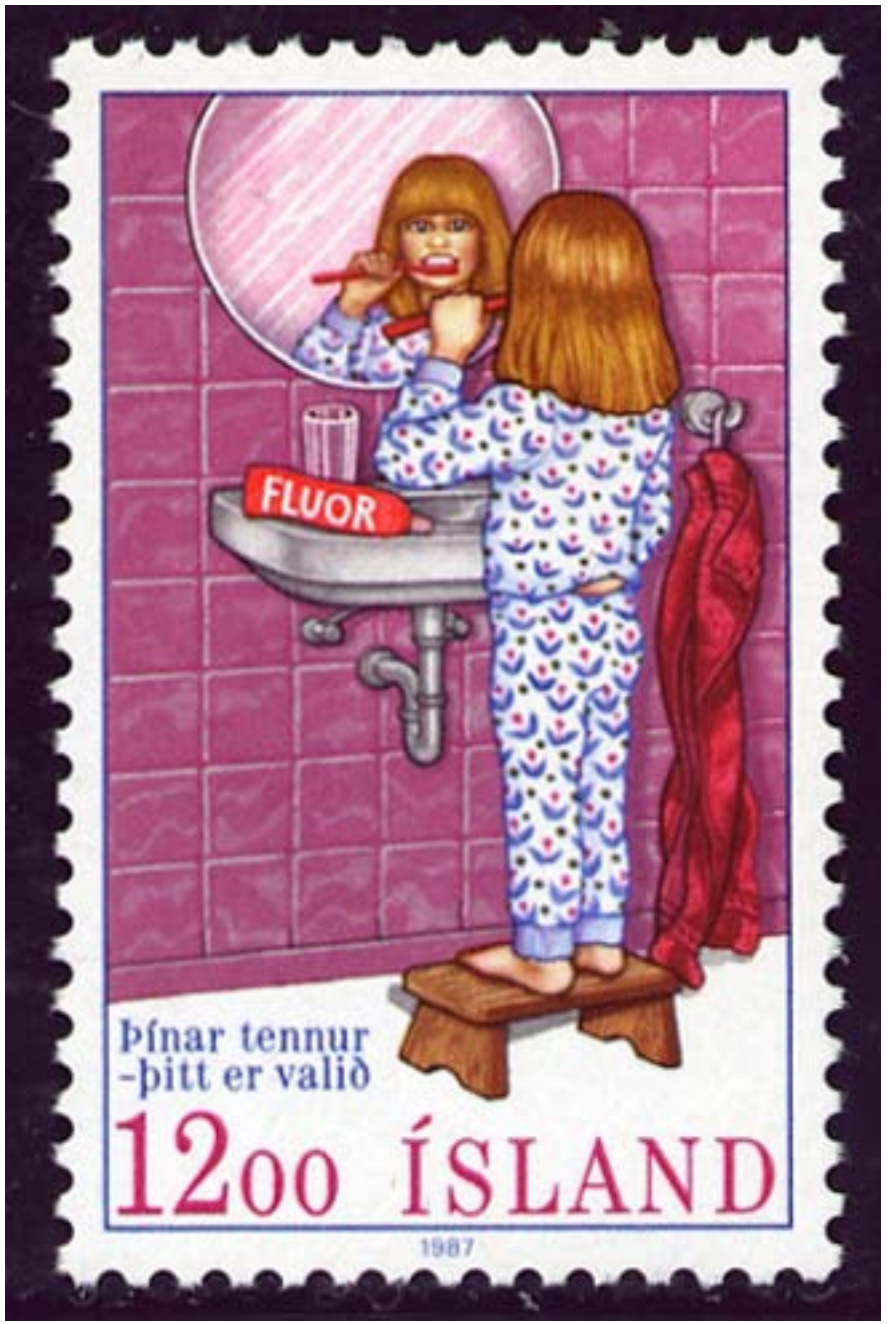
Ozone, O_3

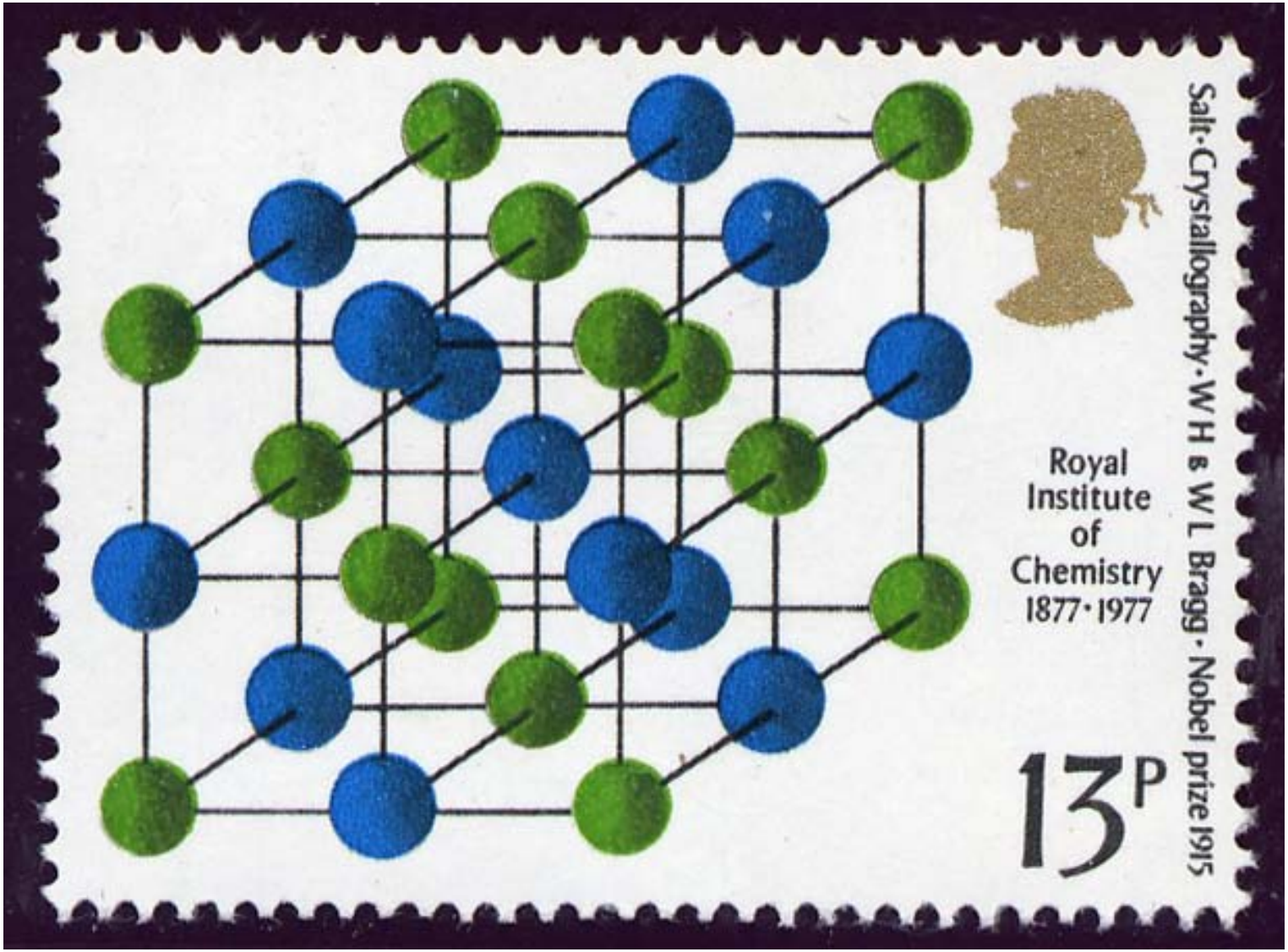




C. F. Schönbein (1799-1868)

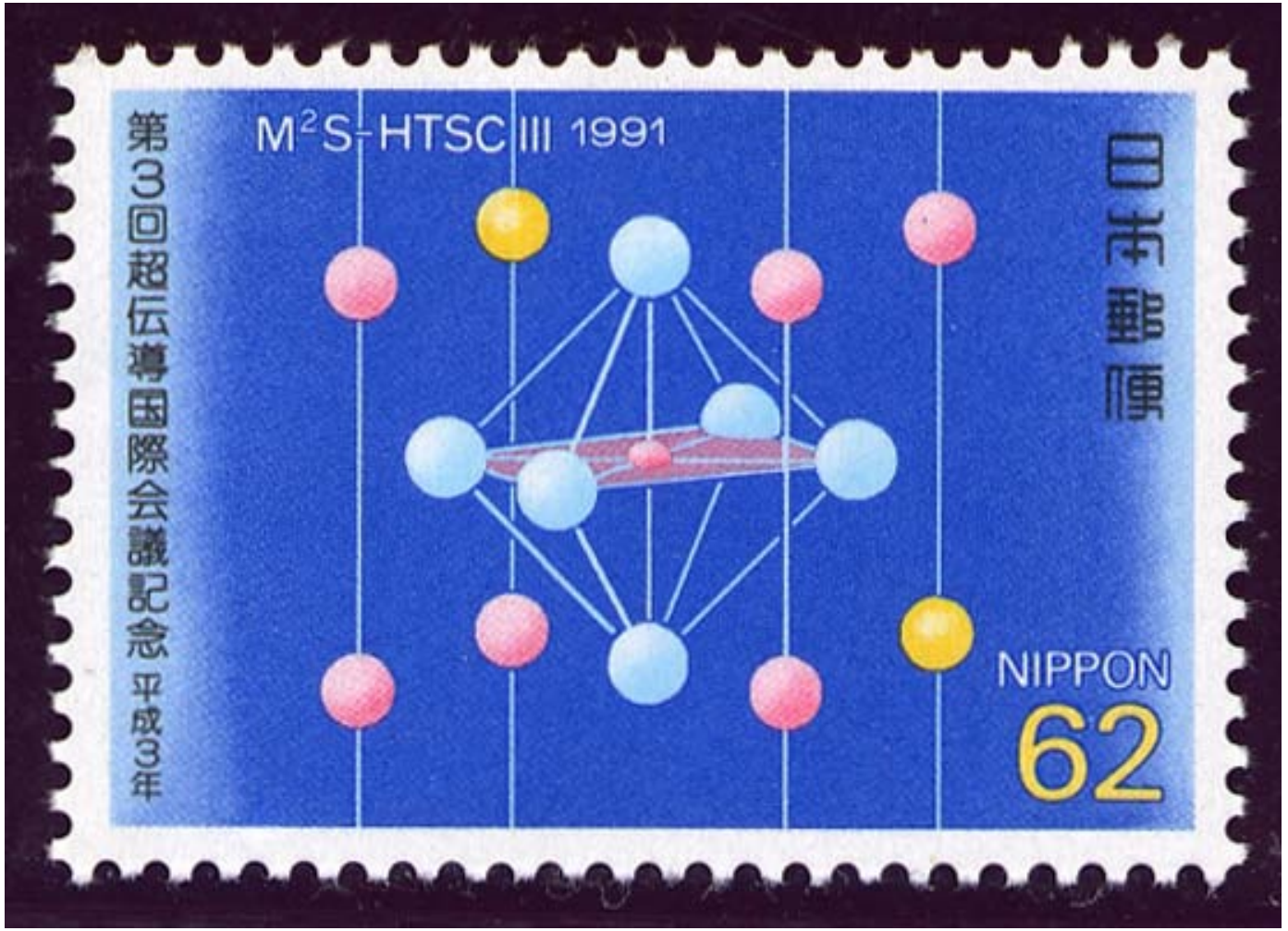
Fluoride & toothpaste



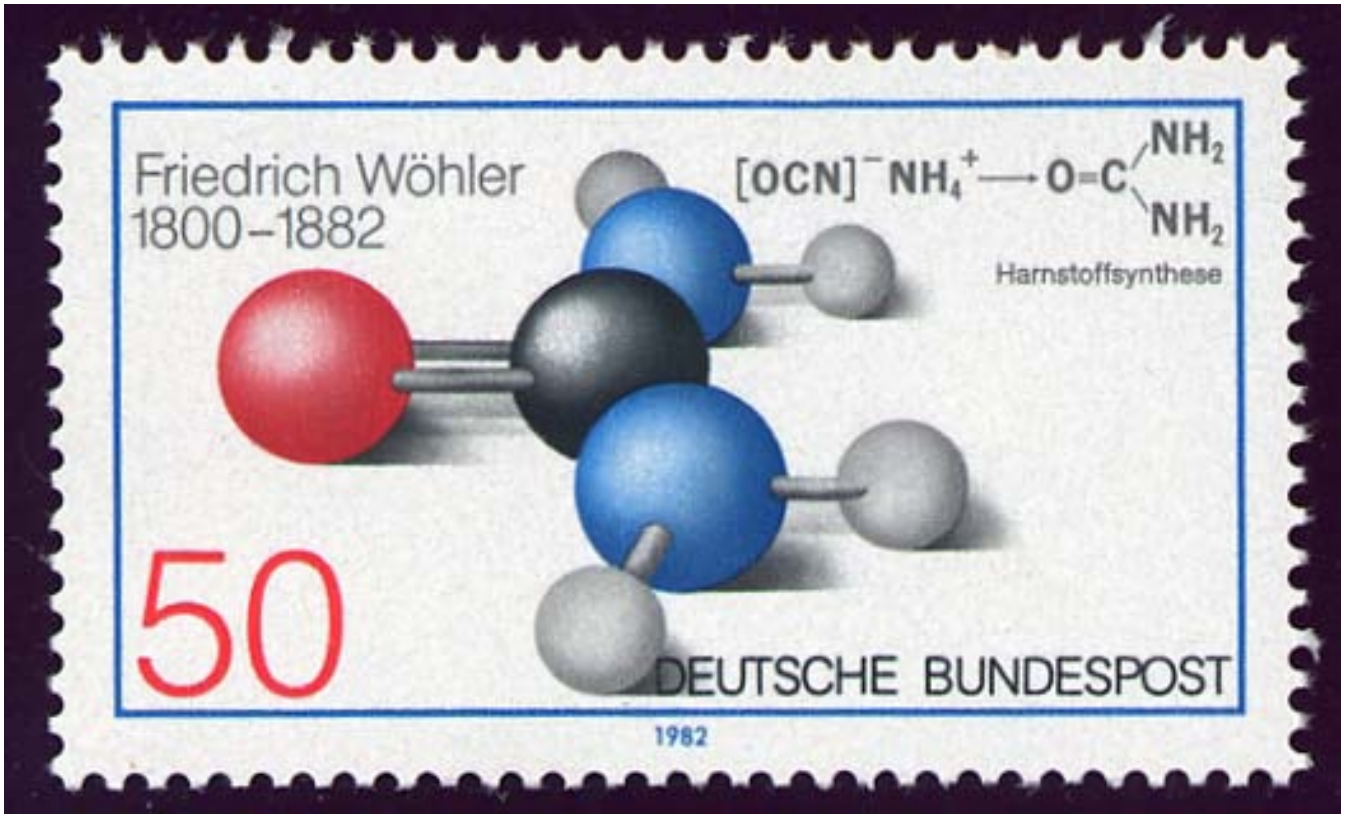

Salt·Crystallography·W H & W L Bragg·Nobel prize 1915
Royal
Institute
of
Chemistry
1877·1977
13P

NaCl

High Temperature SuperConductors



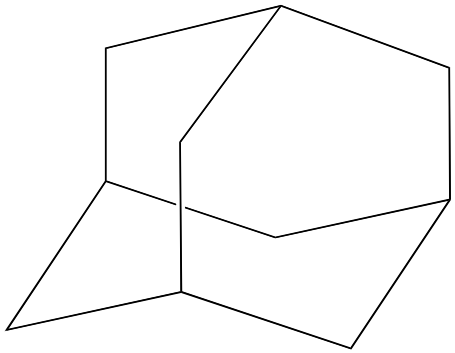
Friedrich Wöhler and the synthesis of urea



- First isolation of pure aluminum.
- Co-discoverer of beryllium, silicon, titanium and yttrium.
- Synthesis of acetylene from calcium carbide.

Vladimir Prelog (1906-1998)
Chemistry Nobel ‘75

adamantane



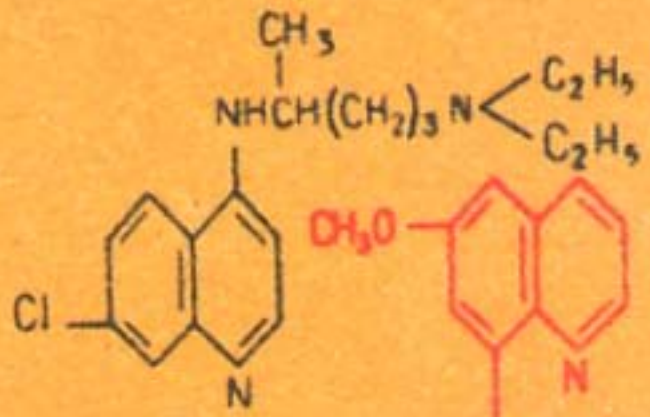
See: *Chemistry International* **2008**, *30* (1), 7.

2,2-difluorobutane

100th anniversary of Geneva Conference (1892)

EL MUNDO UNIDO CONTRA LA MALARIA

CLOROQUINA

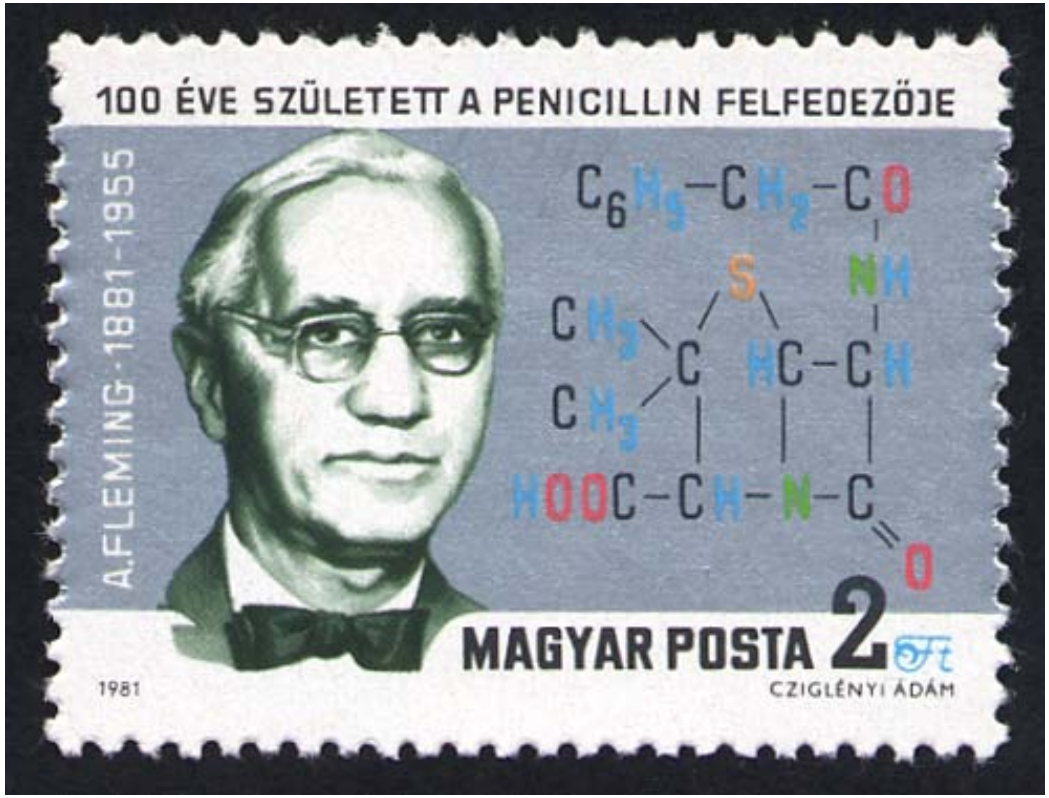


PRIMAQUINA

Chinchona

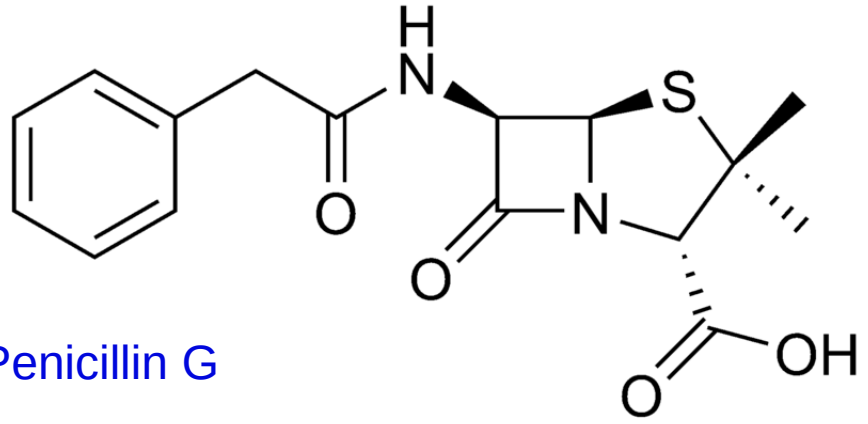
3

CORREOS DE CUBA



Alexander Fleming
(1881-1955)

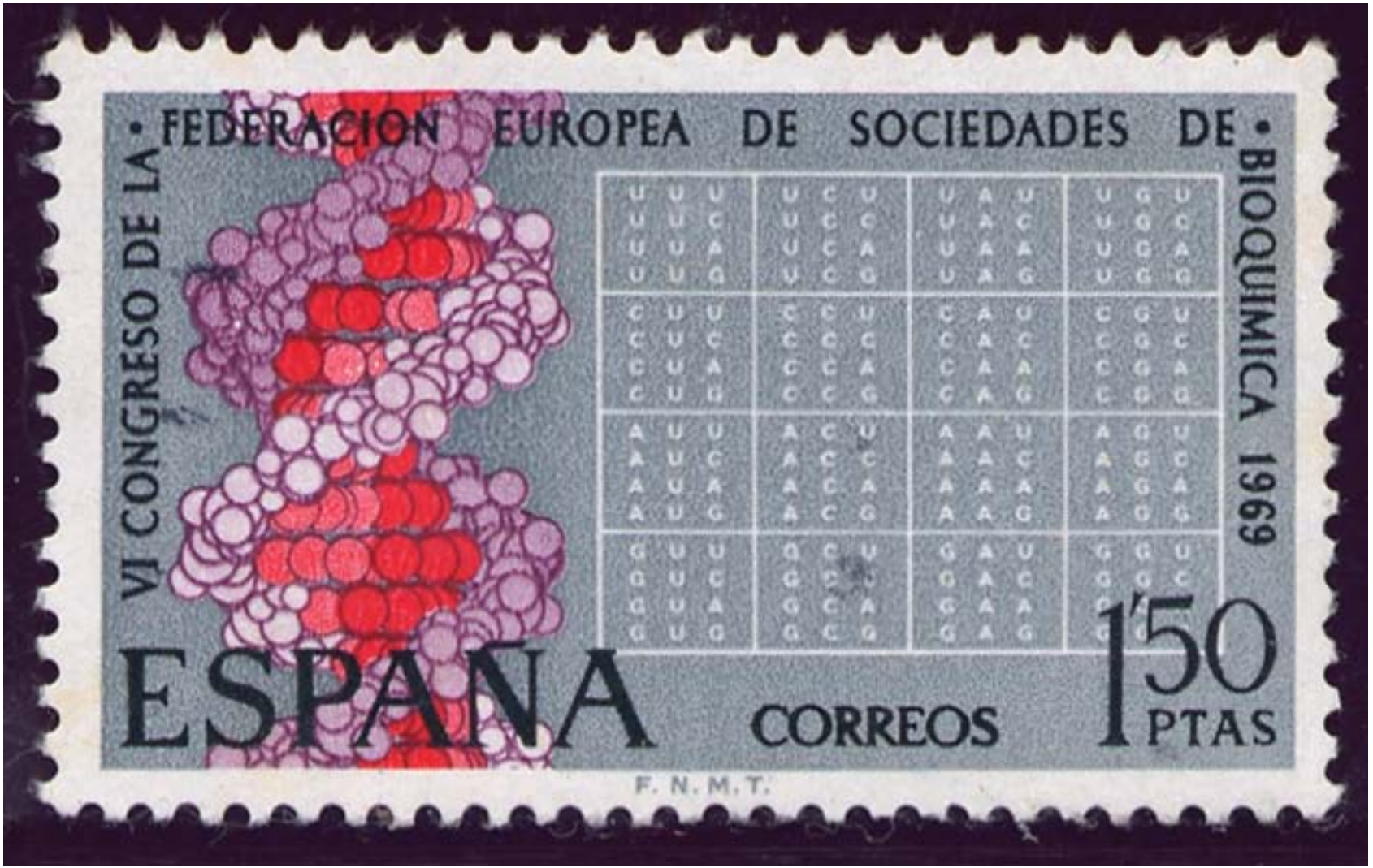
(Medicine, 1945)



Penicillin G

Biochemistry…

The DNA double helix




Millennium 1999/20
Decoding DNA/M Curtis
19
Genome Cracking the Code
MONACO
0,58€
1953
2003
Genetics 1953 – 2003
50c
AUSTRALIA
Genetics 1953 – 2003
50c
AUSTRALIA
RÉPUBLIQUE GABONAISE
poste 2000
découvertes du XXème siècle
structure de l'ADN 1953
225f

Base pairs in DNA: G ⇔ C and A ⇔ T

Glassware…

Glassware


PRODUCTOS
QUIMICOS
MEXICO
EXPORTA
$2800
CORREOS
R. DAVIDSON T. I. E. V.


REPUBLIQUE DE HAUTE-VOLTA
45F
FOIRE DE HANOVRE 1970 ★ SECTION: CHIMIE
REPUBLIQUE FEDERALE DU CAMEROUN
PRIX EL HADJ AHMADOU AHIDJO 1972
40F
POSTES
FEDERAL REPUBLIC OF CAMEROON
DEUTSCHE DEMOKRATISCHE REPUBLIK
75 JAHRE GLAS AUS JENA
25
HELVETIA
110
1882
SGCI
SSIC
1982
APTEEKKILAITOS 300 VUOTTA
APOTEKVÄSENDET ÅR
1,90
Suomi-Finland
USA 20c
Synthetic fuels
Knoxville World's Fair

Chemistry students and chemists…

Chemistry Students

Chemists


80c UNESCO
+20c
BELGIQUE
BELGIE
20 Deutsches Reich 20
10 Deutsche Nothilfe 10

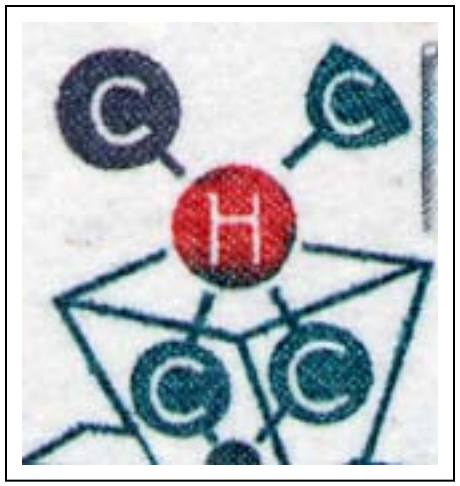
Chemical industry…

Chemical Industry

Fertilizers

Petrochemistry

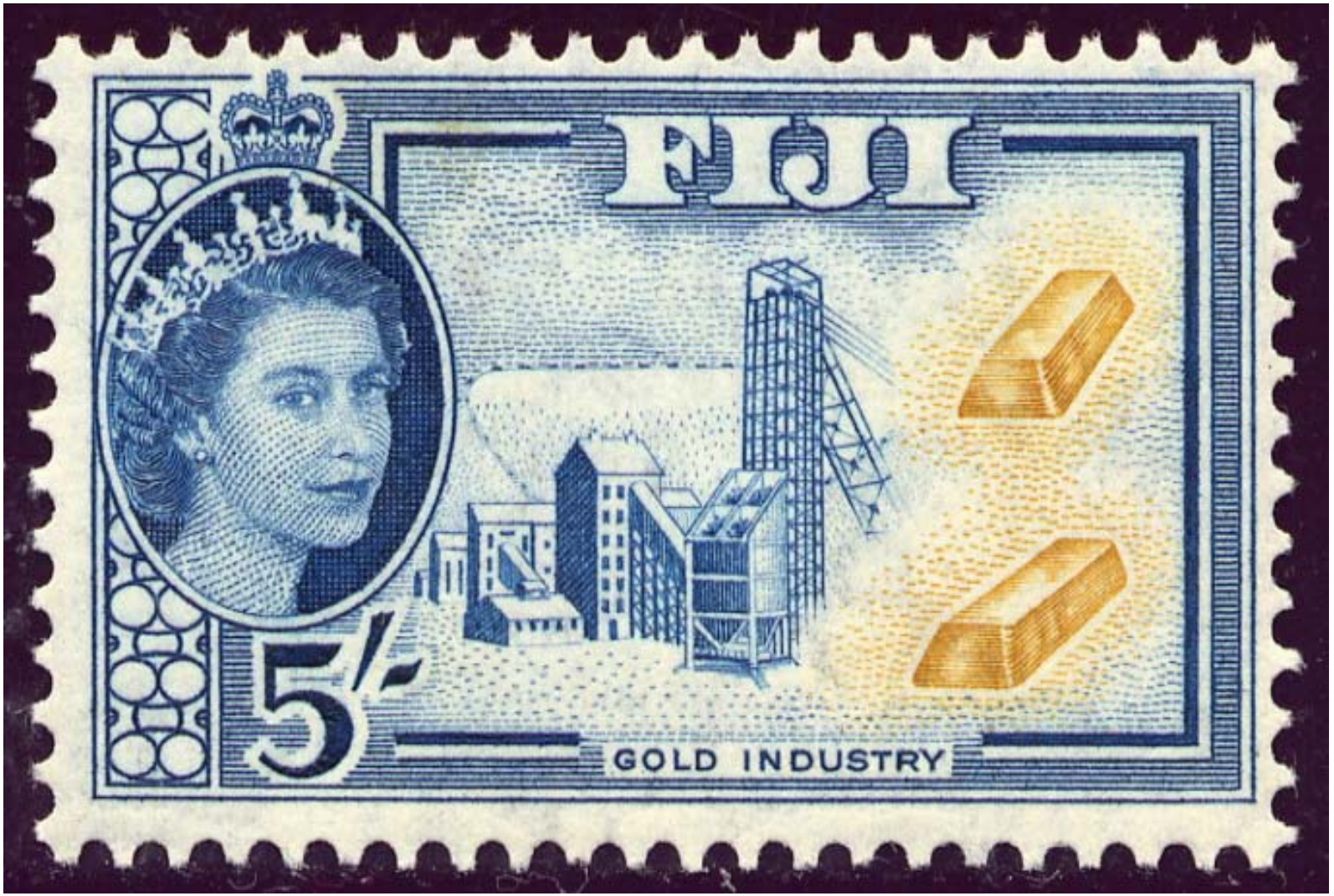
Plastics



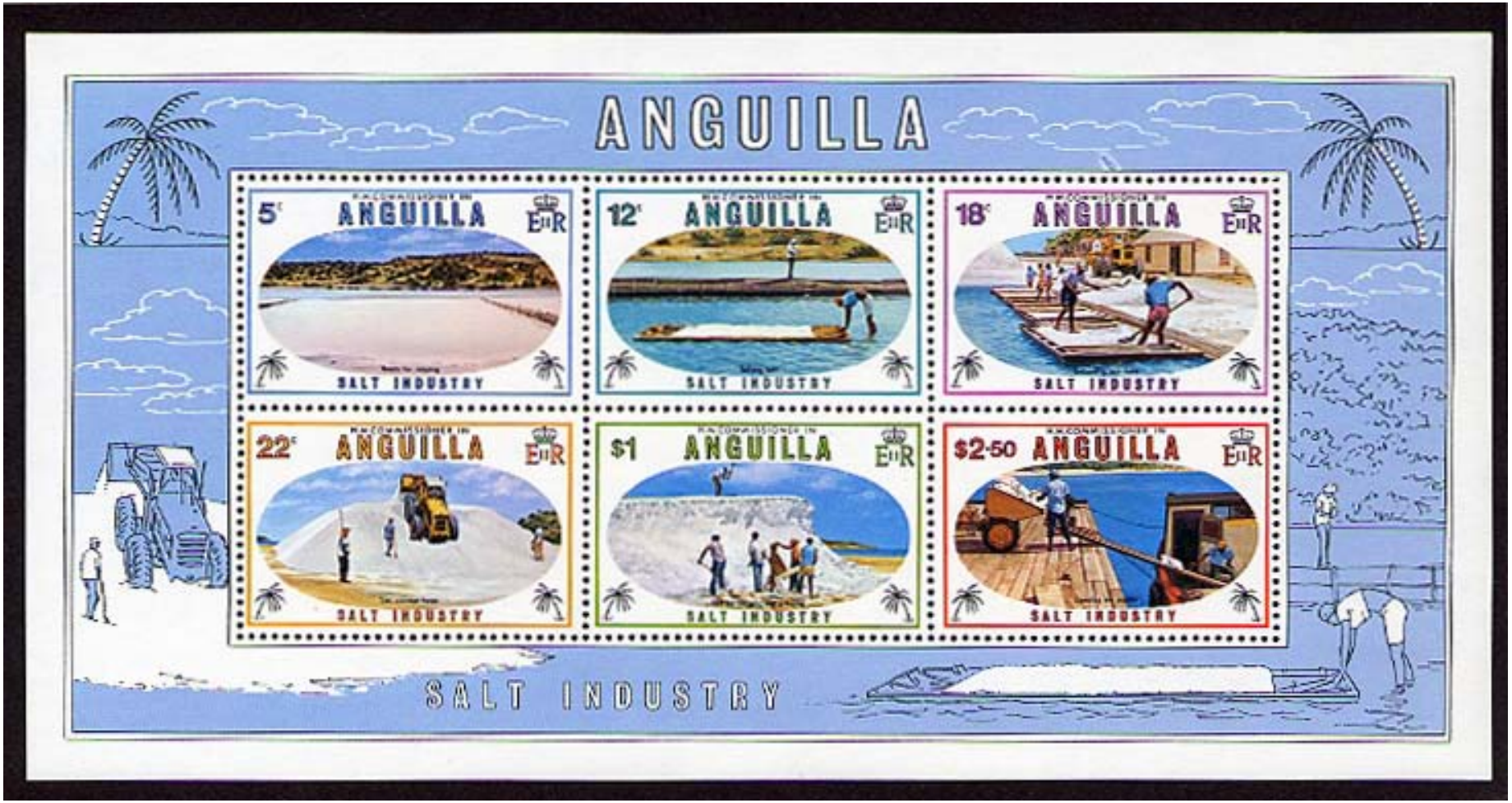
methane: CH_4

FDR, stamp collector

Gold



Salt


ANGUILLA
5¢ ANGUILLA E II R
SALT INDUSTRY
12¢ ANGUILLA E II R
SALT INDUSTRY
18¢ ANGUILLA E II R
SALT INDUSTRY
22¢ ANGUILLA E II R
SALT INDUSTRY
$1 ANGUILLA E II R
SALT INDUSTRY
$2·50 ANGUILLA E II R
SALT INDUSTRY
SALT INDUSTRY

Matches


BUTTERWORTH
1985 07 25
TRANSKEI MATCH INDUSTRY
40
TRANSKEI MATCH INDUSTRY
TRANSKEI
12c
25c
30c
50c
MATCH INDUSTRY
1985 07 25
BUTTERWORTH
TRANSKEI MATCH INDUSTRY
2.5

And a few special items…

Hydrogen balloons…

May 6th, 1936

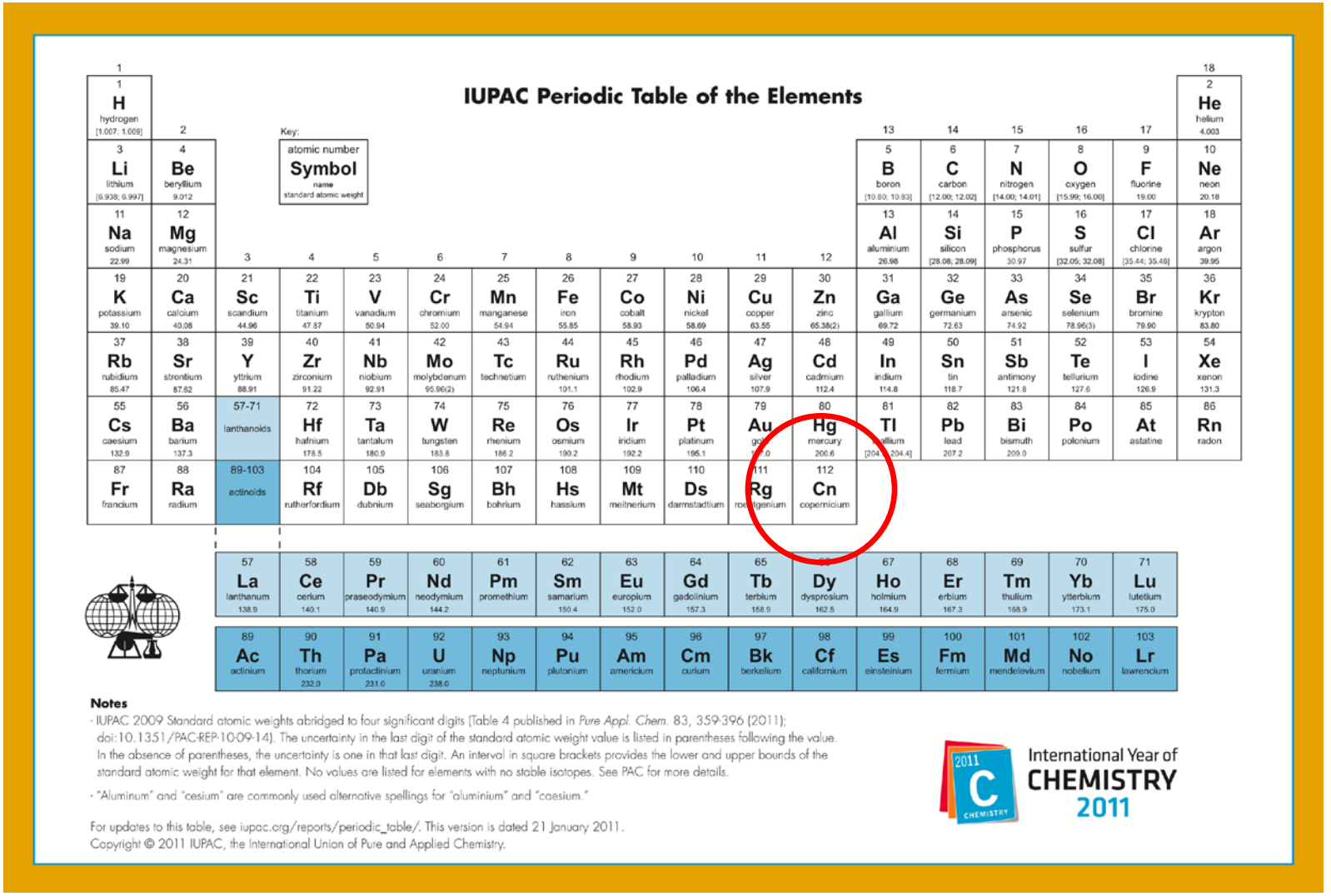
The crash of the "Hindenburg" in Lakehurst, NJ
May 6th, 1937

Element 112: Copernicium

- Name proposed by Sigurd Hofmann *et al.* (Center for Heavy Ion Research) was accepted at the 45th General Assembly of IUPAC (Aug. ’09)

- The proposed chemical symbol (Cp) was initially rejected… and then changed to Cn.

2011 Periodic Table of the Elements (IUPAC)



IUPAC Periodic Table of the Elements

Key: atomic number / Symbol / name / standard atomic weight

1																	18
1 H hydrogen [1.007; 1.009]	2											13	14	15	16	17	2 He helium 4.003
3 Li lithium [6.938; 6.997]	4 Be beryllium 9.012											5 B boron [10.80; 10.83]	6 C carbon [12.00; 12.02]	7 N nitrogen [14.00; 14.01]	8 O oxygen [15.99; 16.00]	9 F fluorine 19.00	10 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.31	3	4	5	6	7	8	9	10	11	12	13 Al aluminium 26.98	14 Si silicon [28.08; 28.09]	15 P phosphorus 30.97	16 S sulfur [32.05; 32.08]	17 Cl chlorine [35.44; 35.46]	18 Ar argon 39.95
19 K potassium 39.10	20 Ca calcium 40.08	21 Sc scandium 44.96	22 Ti titanium 47.87	23 V vanadium 50.94	24 Cr chromium 52.00	25 Mn manganese 54.94	26 Fe iron 55.85	27 Co cobalt 58.93	28 Ni nickel 58.69	29 Cu copper 63.55	30 Zn zinc 65.38(2)	31 Ga gallium 69.72	32 Ge germanium 72.63	33 As arsenic 74.92	34 Se selenium 78.96(3)	35 Br bromine 79.90	36 Kr krypton 83.80
37 Rb rubidium 85.47	38 Sr strontium 87.62	39 Y yttrium 88.91	40 Zr zirconium 91.22	41 Nb niobium 92.91	42 Mo molybdenum 95.96(2)	43 Tc technetium	44 Ru ruthenium 101.1	45 Rh rhodium 102.9	46 Pd palladium 106.4	47 Ag silver 107.9	48 Cd cadmium 112.4	49 In indium 114.8	50 Sn tin 118.7	51 Sb antimony 121.8	52 Te tellurium 127.6	53 I iodine 126.9	54 Xe xenon 131.3
55 Cs caesium 132.9	56 Ba barium 137.3	57-71 lanthanoids	72 Hf hafnium 178.5	73 Ta tantalum 180.9	74 W tungsten 183.8	75 Re rhenium 186.2	76 Os osmium 190.2	77 Ir iridium 192.2	78 Pt platinum 195.1	79 Au gold [illegible]	80 Hg mercury 200.6	81 Tl thallium [204.[illegible]; 204.4]	82 Pb lead 207.2	83 Bi bismuth 209.0	84 Po polonium	85 At astatine	86 Rn radon
87 Fr francium	88 Ra radium	89-103 actinoids	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium	109 Mt meitnerium	110 Ds darmstadtium	111 Rg roentgenium	112 Cn copernicium						

57 La lanthanum 138.9	58 Ce cerium 140.1	59 Pr praseodymium 140.9	60 Nd neodymium 144.2	61 Pm promethium	62 Sm samarium 150.4	63 Eu europium 152.0	64 Gd gadolinium 157.3	65 Tb terbium 158.9	[illegible] Dy dysprosium 162.5	67 Ho holmium 164.9	68 Er erbium 167.3	69 Tm thulium 168.9	70 Yb ytterbium 173.1	71 Lu lutetium 175.0
89 Ac actinium	90 Th thorium 232.0	91 Pa protactinium 231.0	92 U uranium 238.0	93 Np neptunium	94 Pu plutonium	95 Am americium	96 Cm curium	97 Bk berkelium	98 Cf californium	99 Es einsteinium	100 Fm fermium	101 Md mendelevium	102 No nobelium	103 Lr lawrencium

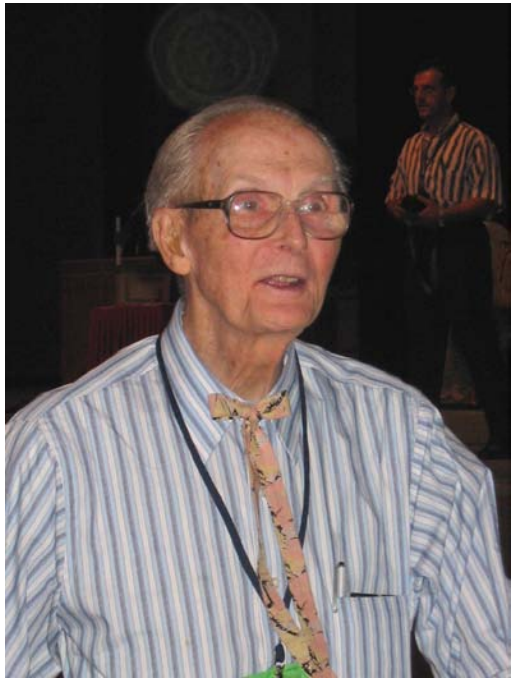
Notes

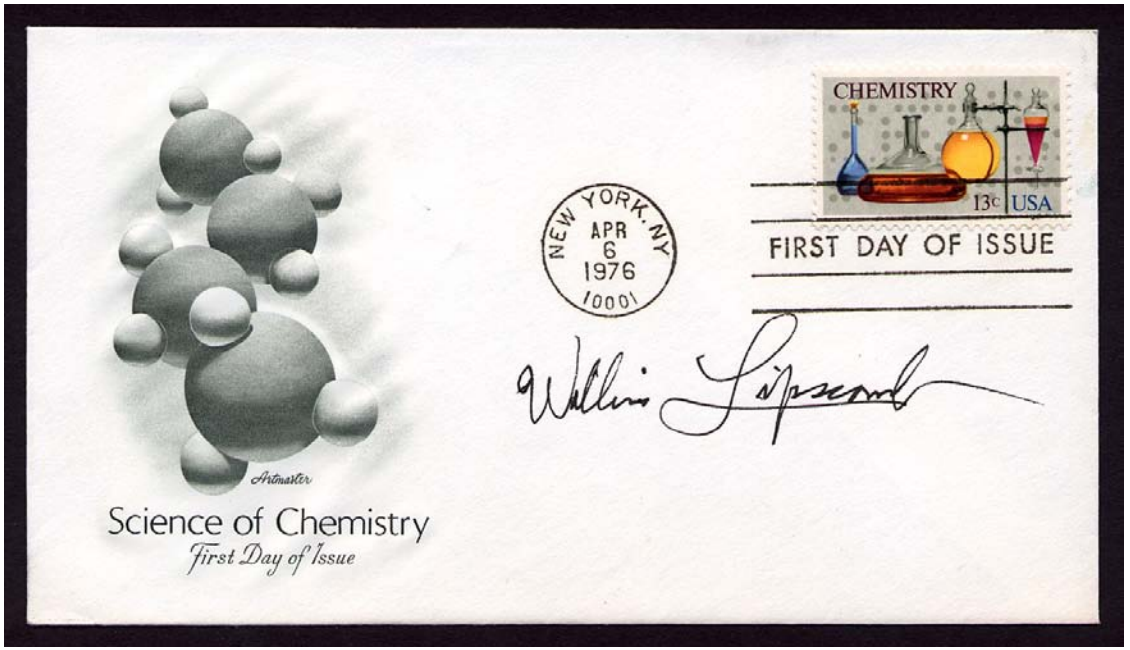
- IUPAC 2009 Standard atomic weights abridged to four significant digits (Table 4 published in *Pure Appl. Chem.* 83, 359-396 (2011); doi:10.1351/PAC-REP-10-09-14). The uncertainty in the last digit of the standard atomic weight value is listed in parentheses following the value. In the absence of parentheses, the uncertainty is one in that last digit. An interval in square brackets provides the lower and upper bounds of the standard atomic weight for that element. No values are listed for elements with no stable isotopes. See PAC for more details.
- "Aluminum" and "cesium" are commonly used alternative spellings for "aluminium" and "caesium."

For updates to this table, see iupac.org/reports/periodic_table/. This version is dated 21 January 2011.

International Year of CHEMISTRY 2011

William N. Lipscomb and the 40th IUPAC Congress in Beijing (Aug. '05)





1976 Nobel Prize in Chemistry "for his studies on the structure of boranes illuminating problems of chemical bonding"

Found on eBay:

a Collection of Chemistry Nobel Laureate Signatures

Christian Anfinsen
Chemistry '72
1916-1995

William F. Giauque
Chemistry '49
1895-1982

Robert S. Mulliken
Chemistry '66
1896-1986

Glenn T. Seaborg
Chemistry '51
1912-1999

William N. Lipscomb
Chemistry '76
1919-2011

John Cornforth
Chemistry '75
1917-

Geoffrey Wilkinson
Chemistry '73
1921-1996

Vladimir Prelog
Chemistry '75
1906-1998

Harold C. Urey
Chemistry '34
1893-1981

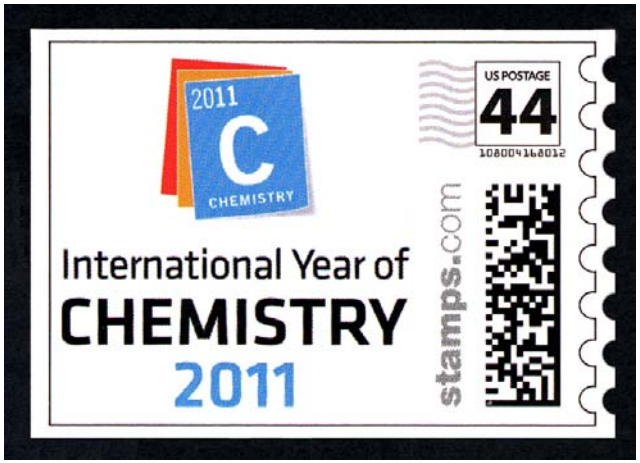
Gerhard Herzberg
Chemistry '71
1904-1999

IYC Stamps

2011

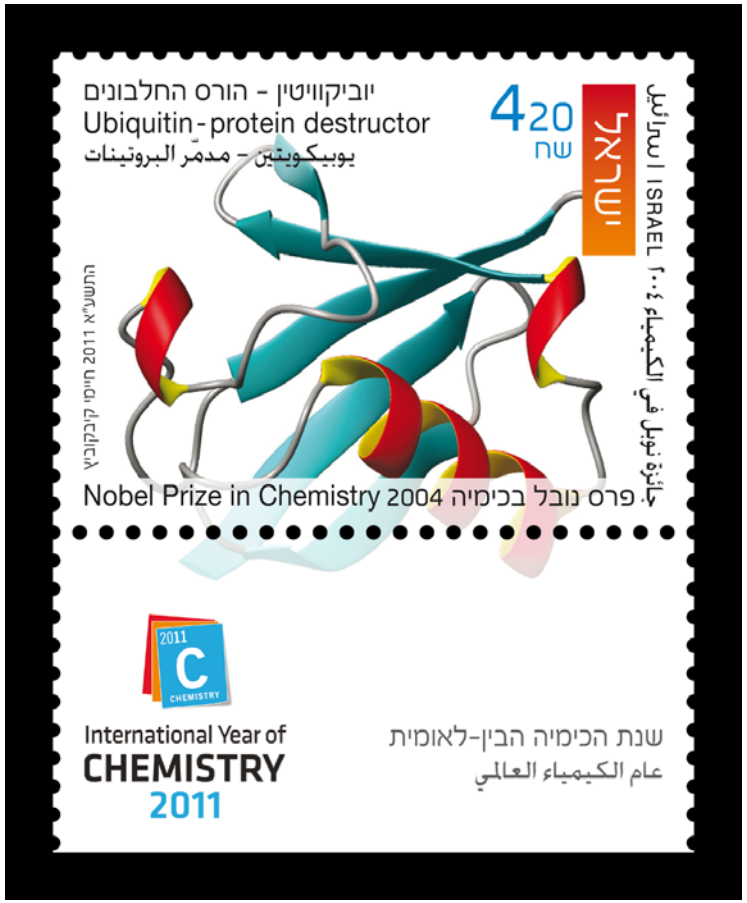
The International Year of Chemistry (IYC)

www.chemistry2011.org



- IUPAC Project: *Global Stamp Competition*.
- "Chemistry on Stamps" *Symposium and Stamp Exhibition* at the 242nd National ACS meeting in Denver, CO (Fall '11).

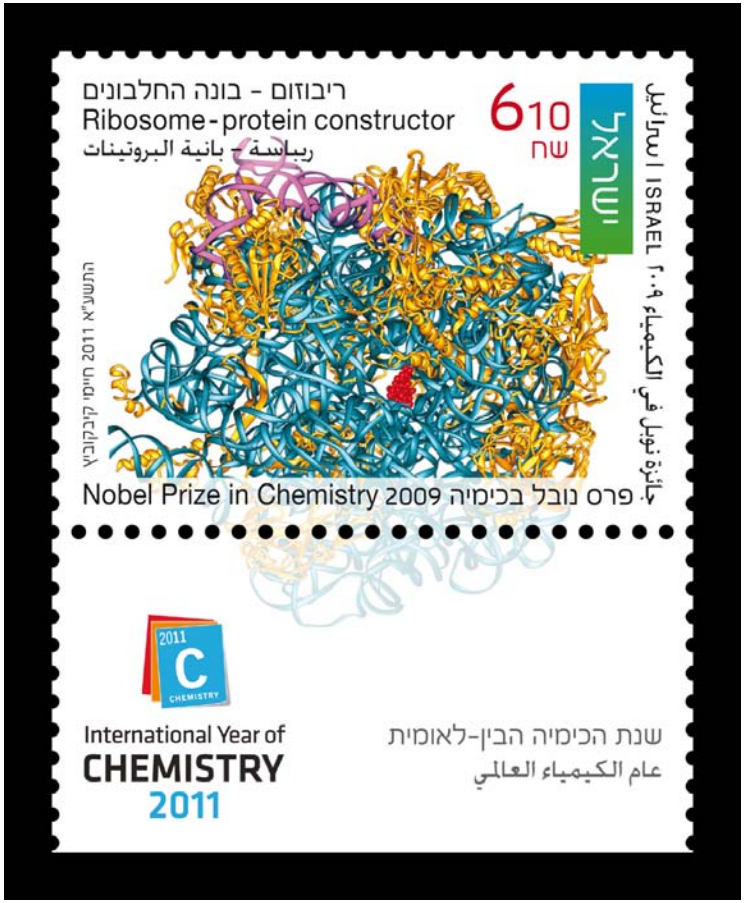
First IYC ‘11 Stamps (*4 January 2011*): Israel



ubiquitin – protein destructor

Ciechanover & Hershko (Technion)

Chemistry Nobel ‘04



ribosome – protein constructor

Ada Yonath (WIT)

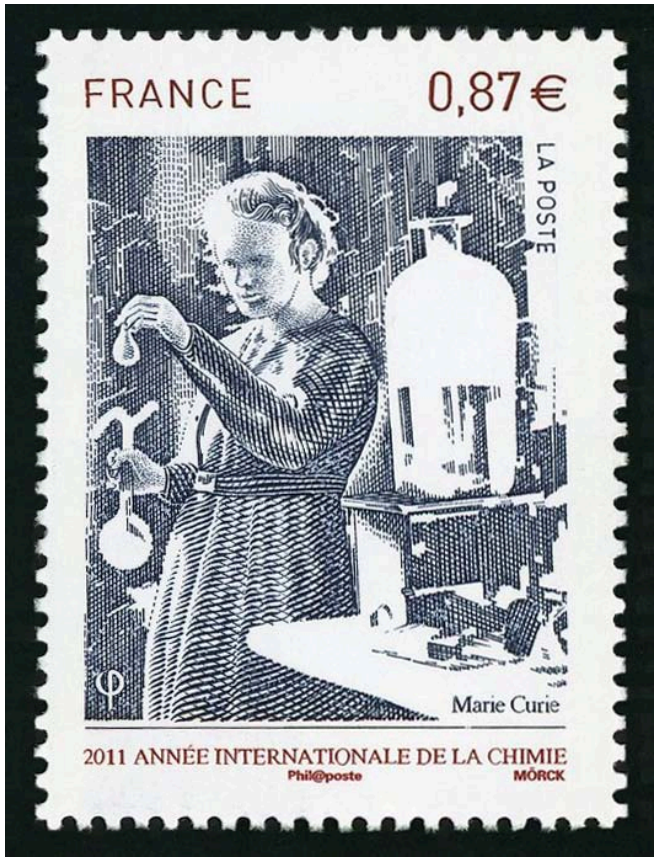
Chemistry Nobel ‘09

IYC ’11 Stamps: Slovakia

Date of issue:
17 January 2011

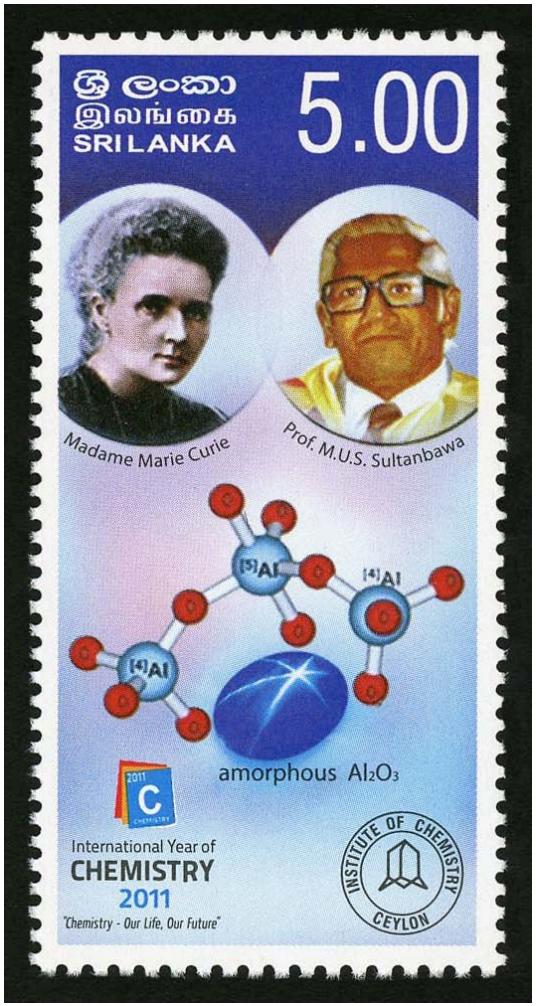
IYC ’11 Stamps: Belgium & France

Date of issue:
17 January 2011



Date of issue:
27 January 2011

IYC ’11 Stamps:
Sri Lanka & Spain

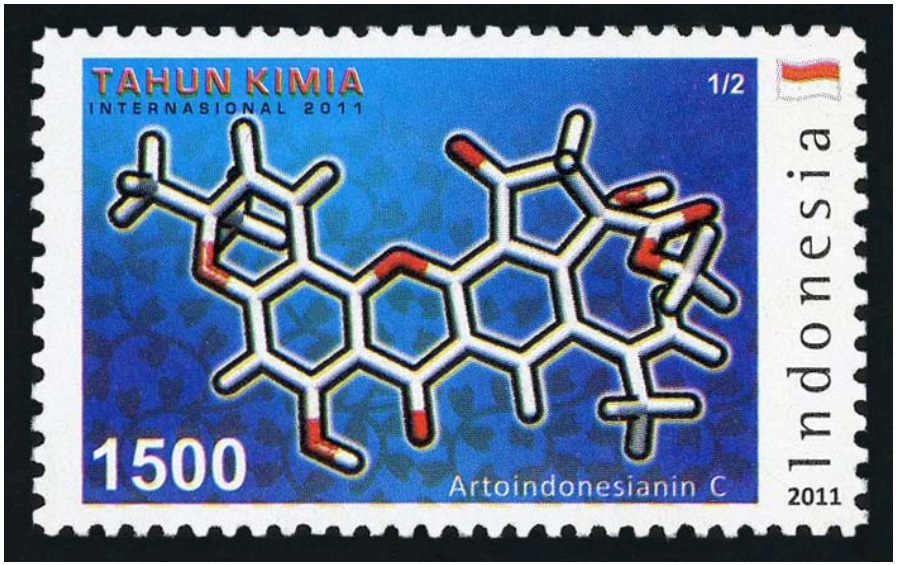


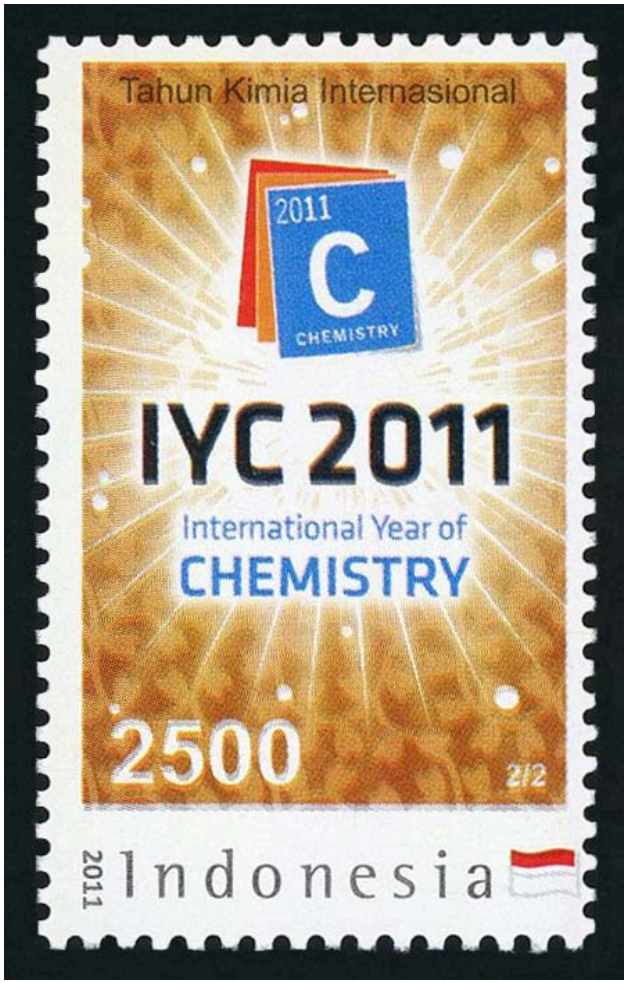
Date of issue:
30 January 2011

Date of issue:
7 February 2011

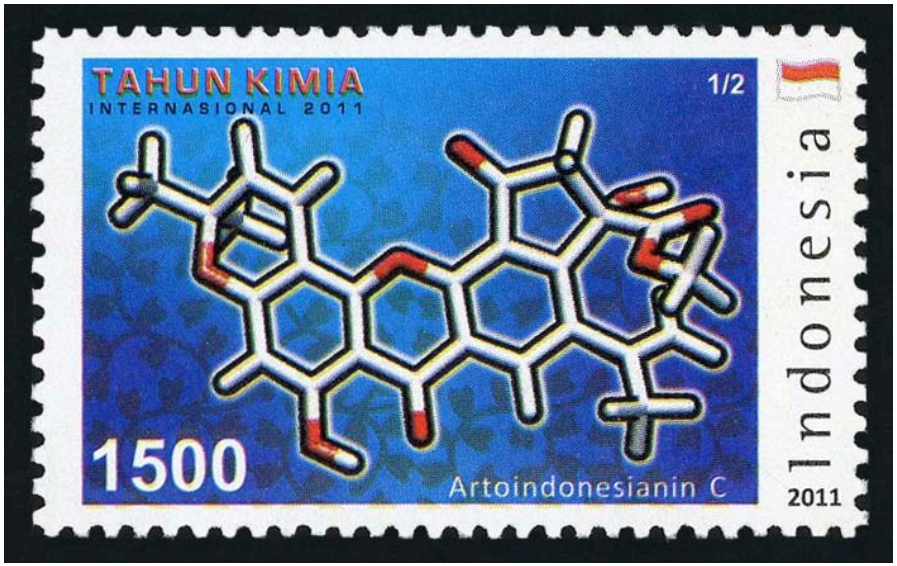
IYC ’11 Stamps: Indonesia

Date of issue:
1 March 2011



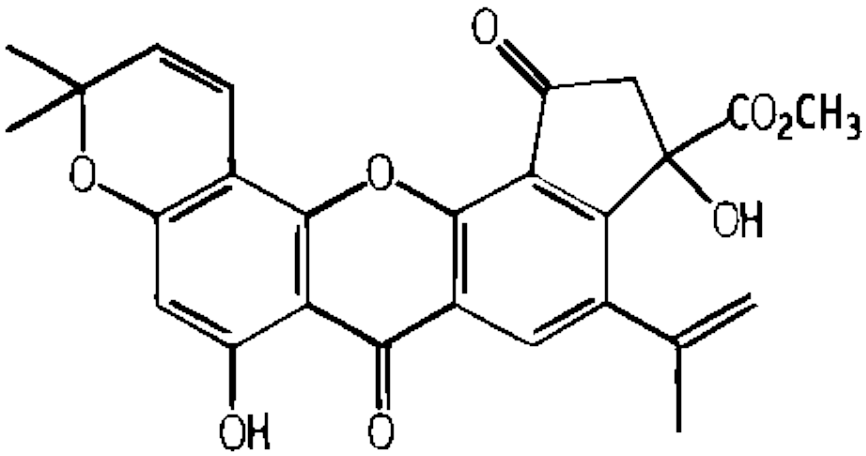


IYC ’11 Stamps: Indonesia

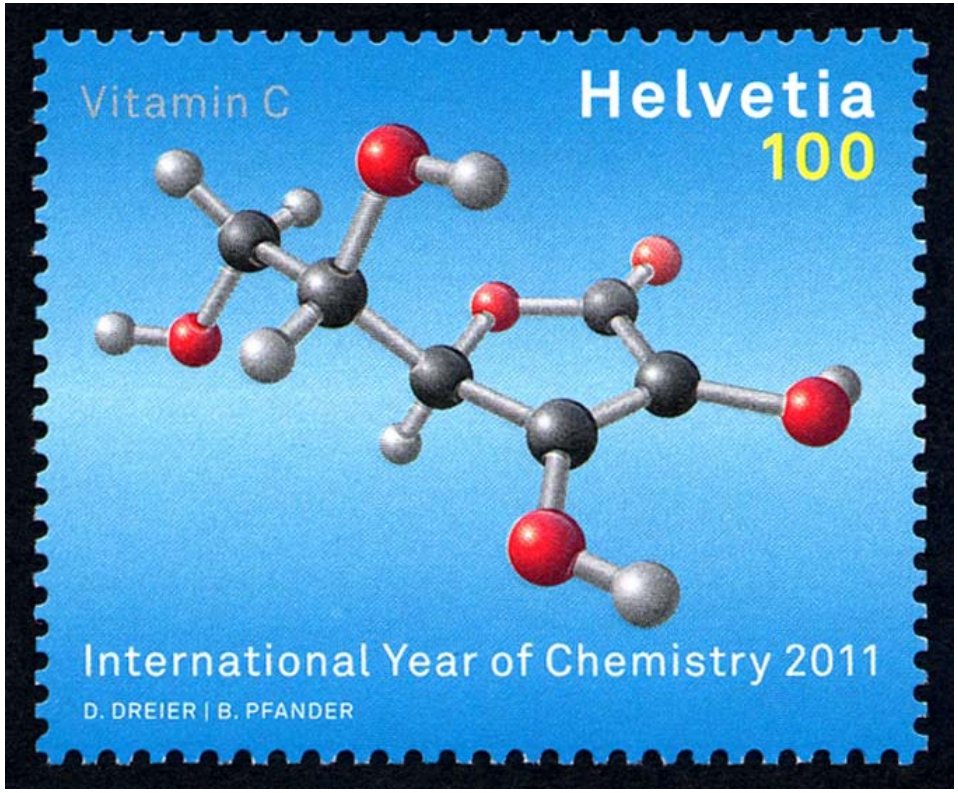


Artoindonesianin C

S.A. Achmad et al.
J. Nat. Prod. **2000**, *63*, 243-244.



IYC ’11 Stamps: Switzerland



Date of issue: 3 March 2011

Synthesis of vitamin C: Sir Norman Haworth & Tadeusz Reichstein

Chemistry ‘37 *Phys or Med ‘50*

IYC ’11 Stamps: Jersey & Bosnia and Herzegovina

Date of issue: 8 March 2011

(International Women’s Day!)

IYC ’11 Stamps: Macedonia

Date of issue: 13 April 2011

IYC ’11 Stamps: Paraguay

Date of issue: 9 May 2011

The Chemistry and Physics on Stamps Study Unit (**CPOSSU**)

- Non-profit organization that promotes the philatelic study of chemistry, physics, and related fields.
- Started in 1979, currently *ca.* 160 members worldwide.

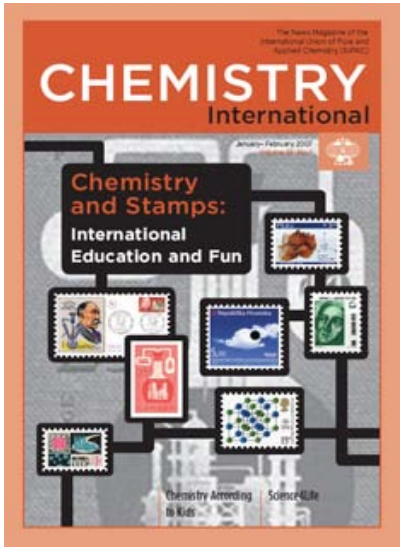
www.cpossu.org

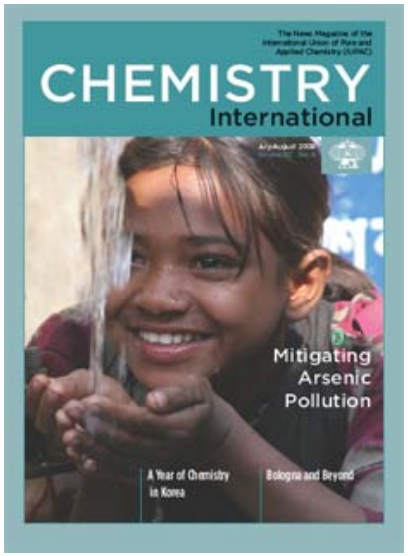
- Publishes *Philatelia Chimica et Physica* (4 issues/year).

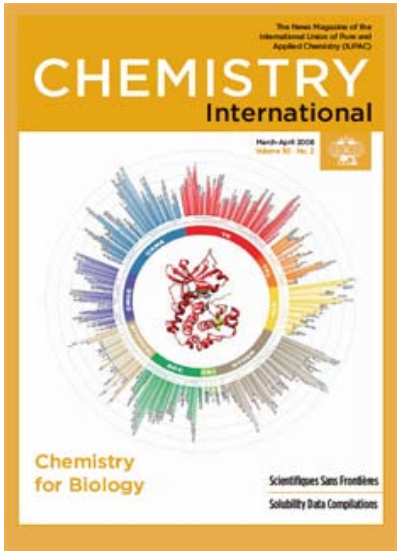
Chemistry International

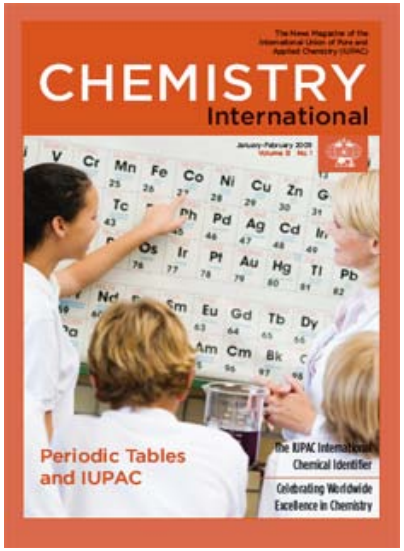
- Bimonthly newsmagazine of IUPAC:

www.iupac.org/publications/ci









Hydrogen to Copernicium:
Postage Stamps as Cultural Icons in the IYC

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