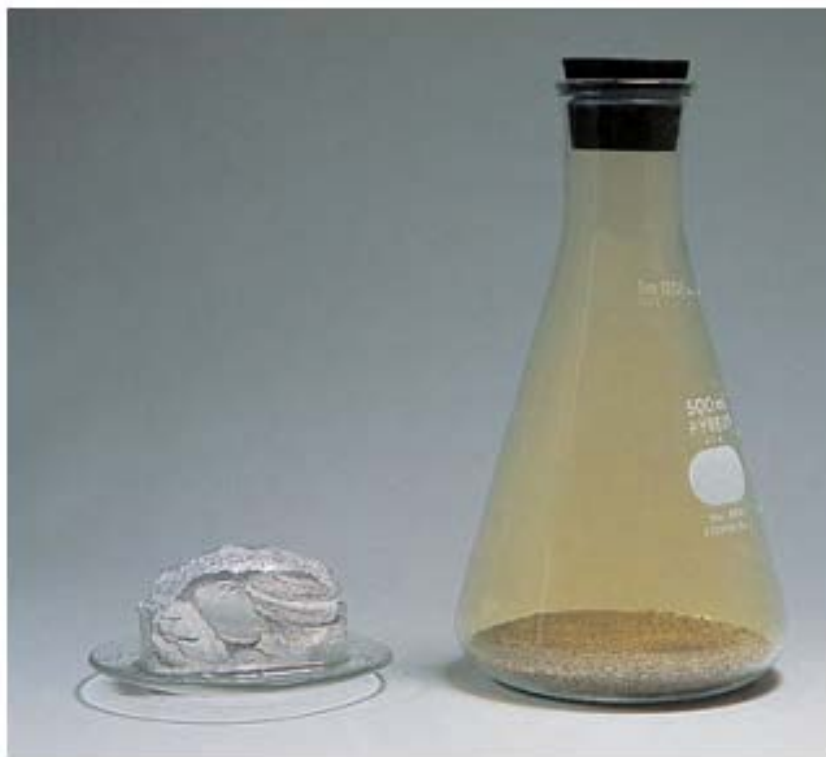


GENERAL CHEMISTRY

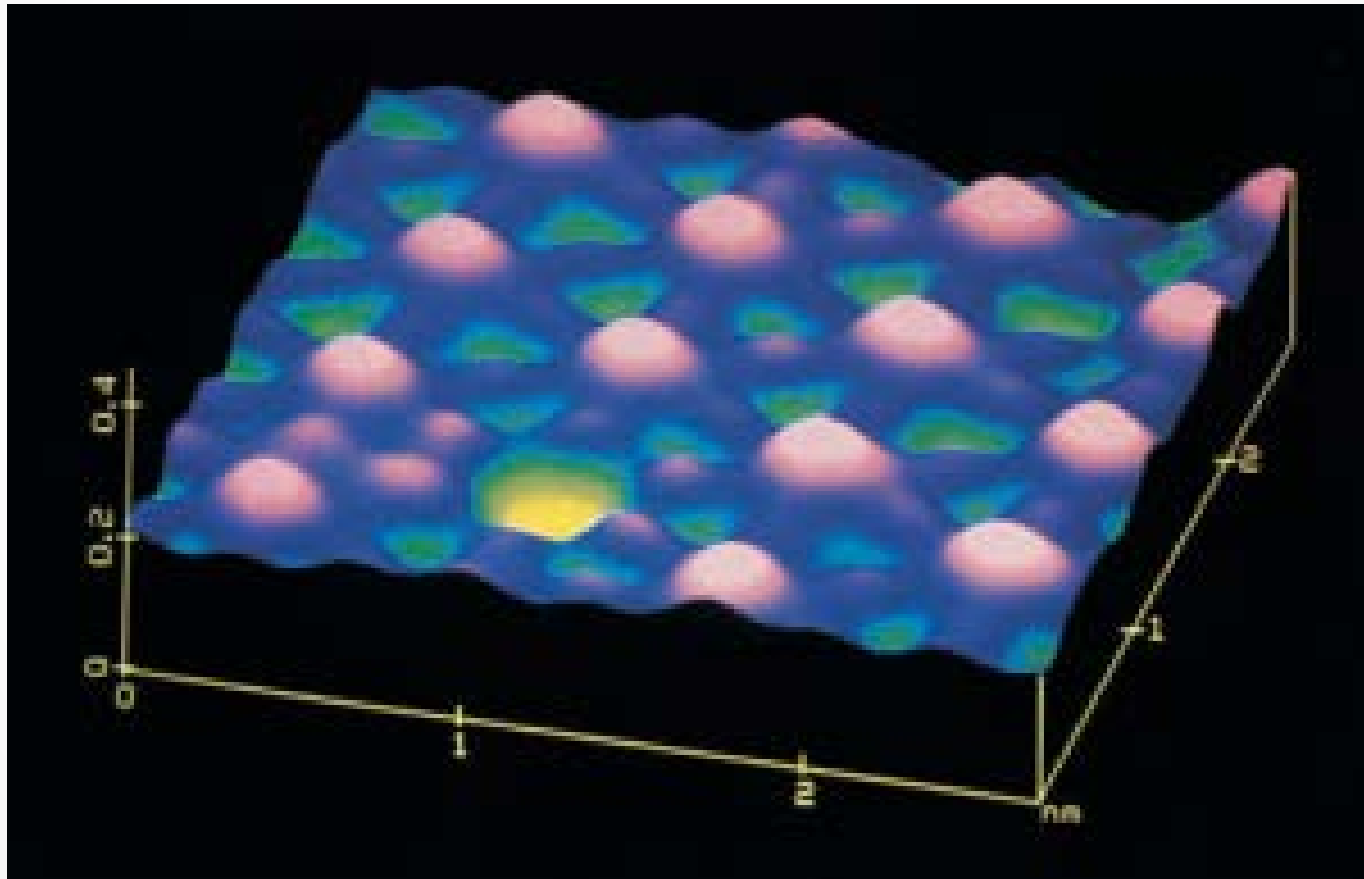
ATOMIC THEORY AND ATOMIC
STRUCTURE



- Reaction of Sodium and Chlorine



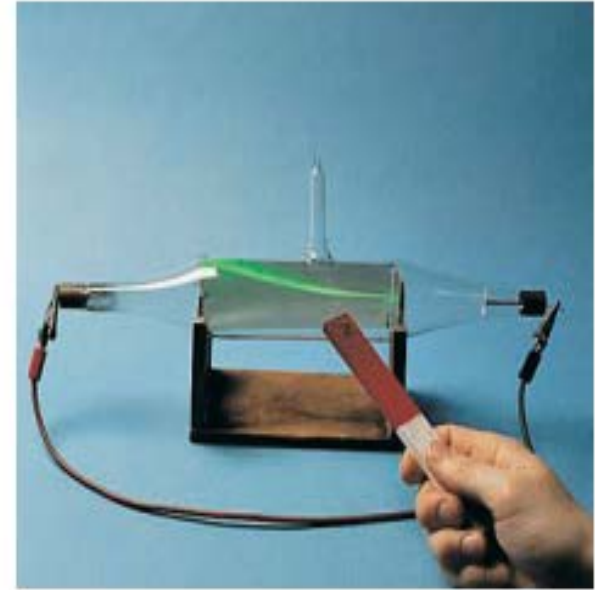
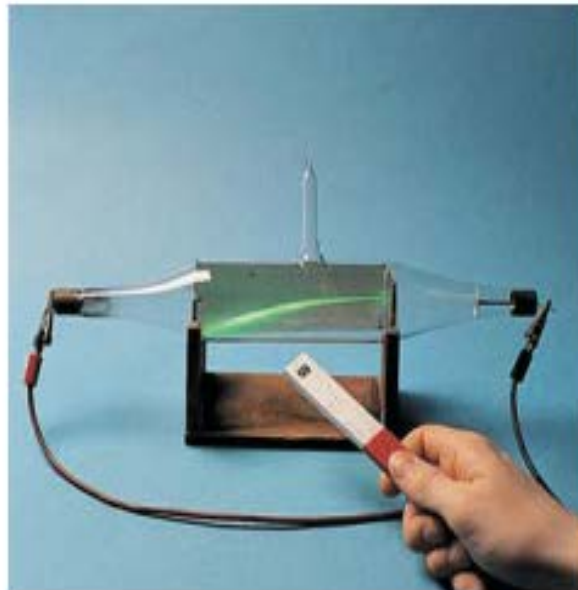
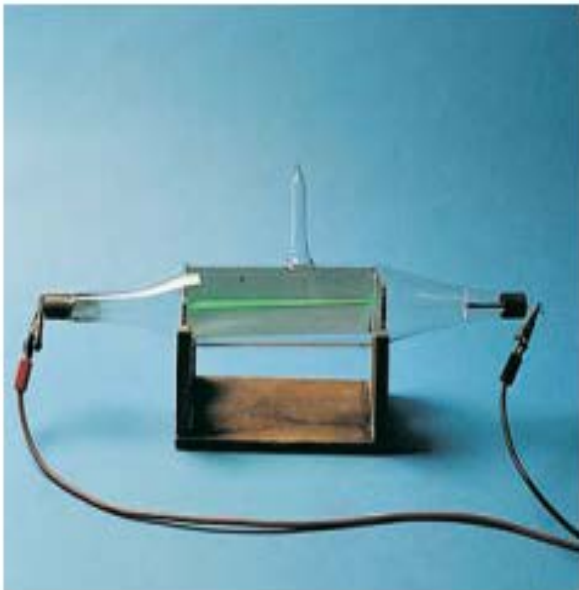
- Iodine atoms in on a platinum metal surface

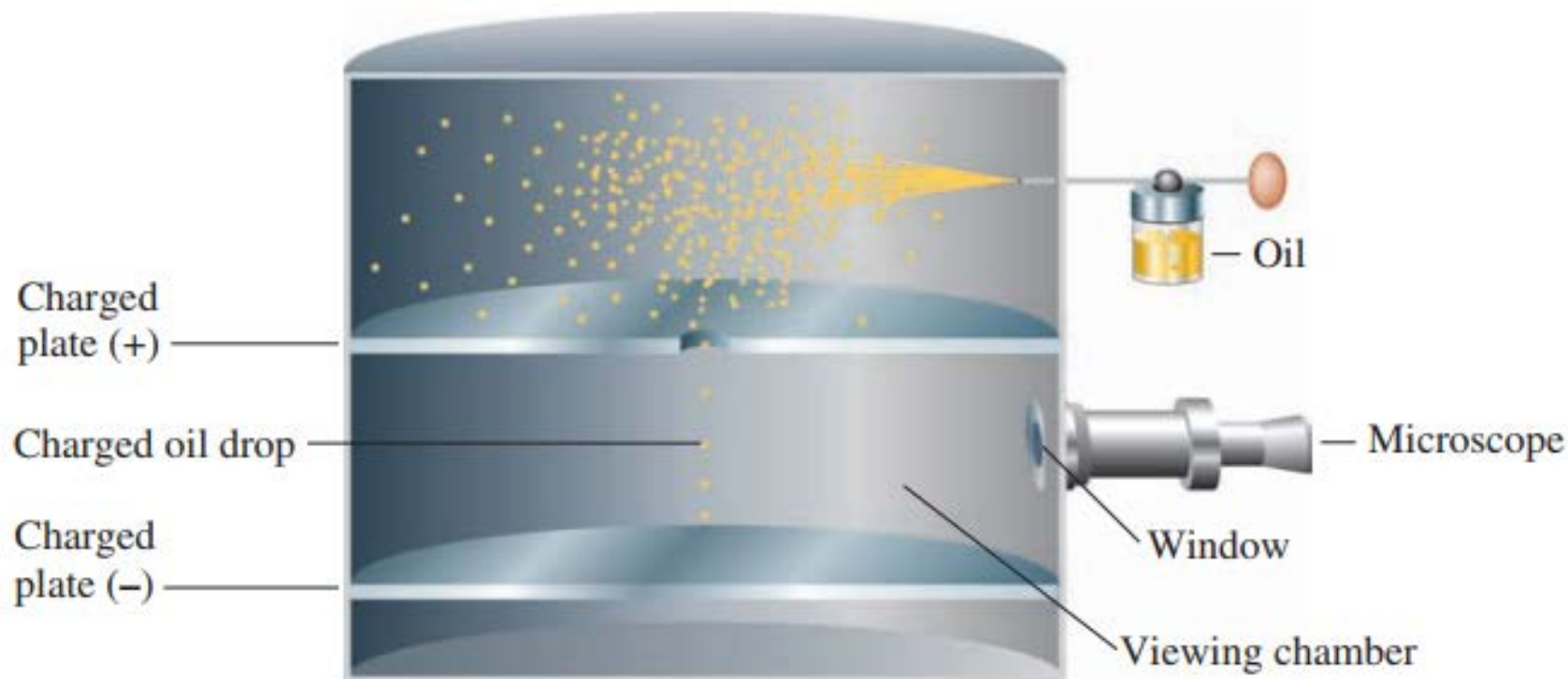


nil (0), **un** (1), **bi** (2), **tri** (3), **quad** (4), **pent** (5),
hex (6), **sept** (7), **oct** (8), and **enn** (9) with the
ending **-ium**.

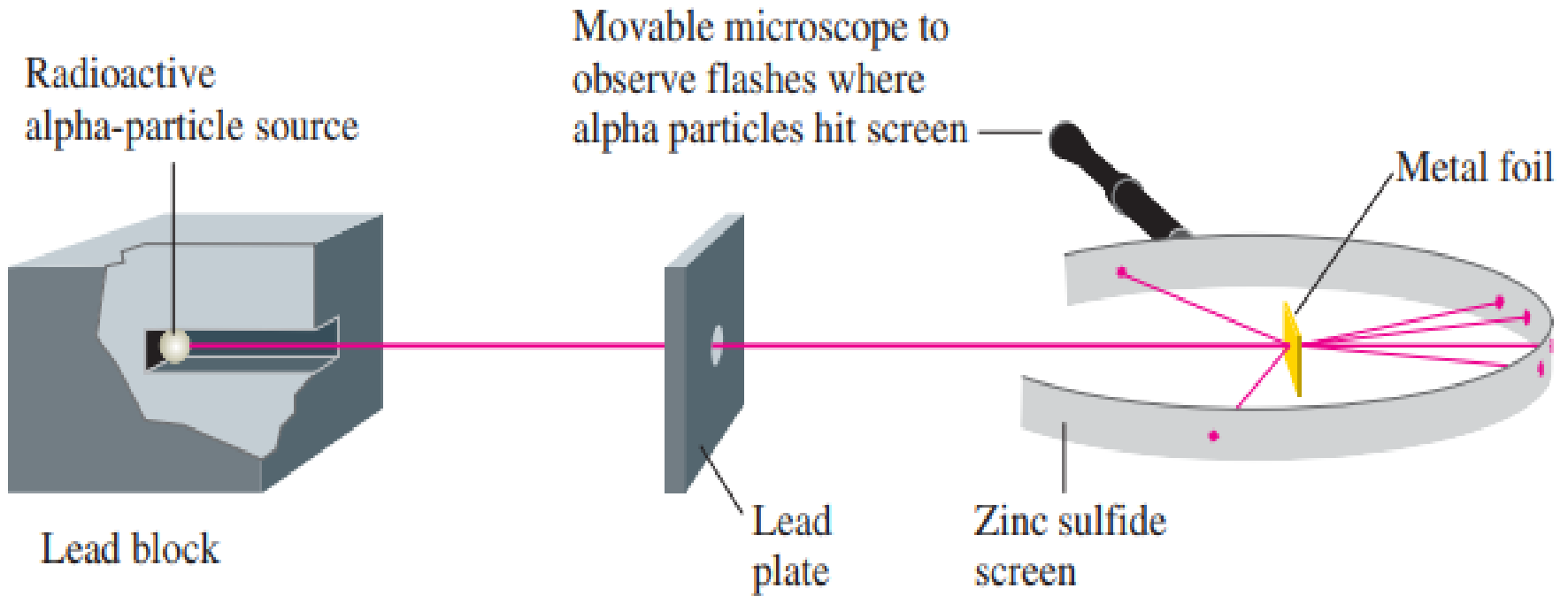
*ununhexium_-- its atomic symbol is **Uuh***

- Bending of Cathode Rays by a Magnet

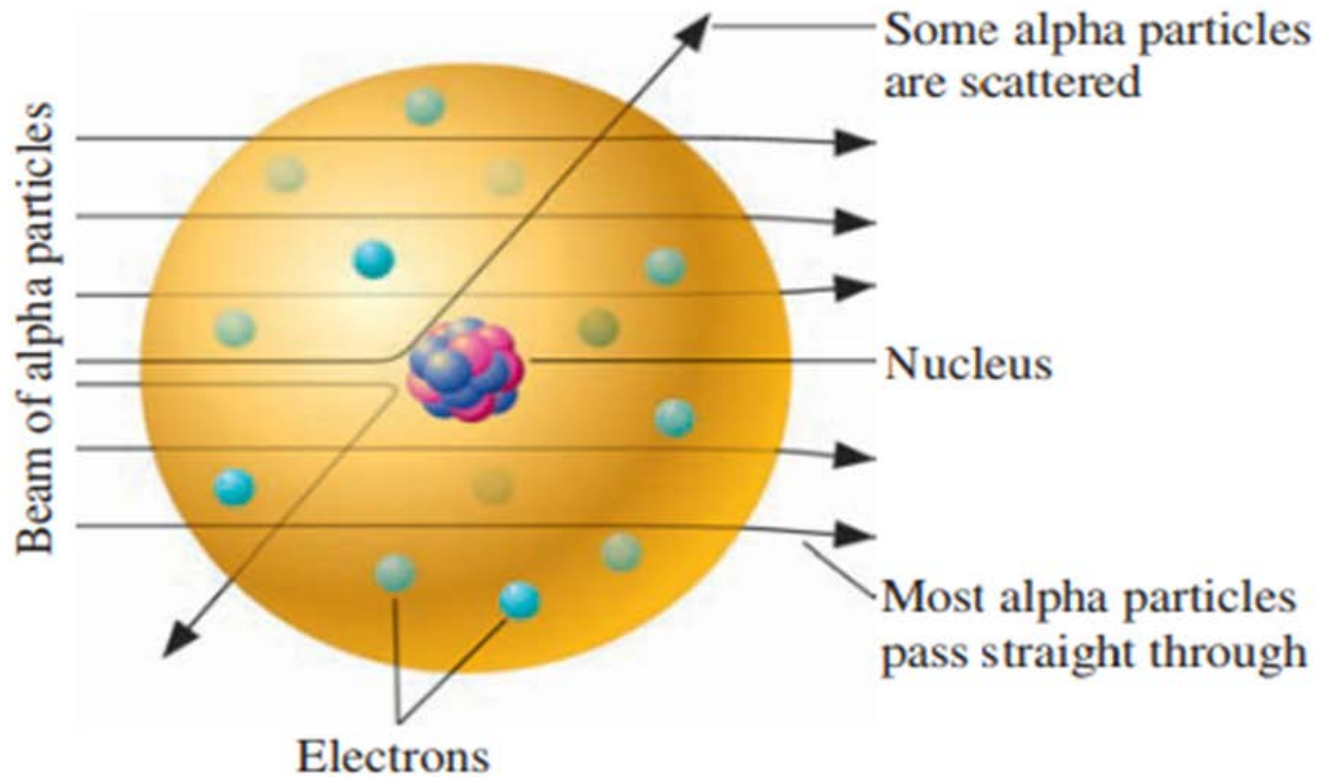




- Millikan's oil-drop experiment

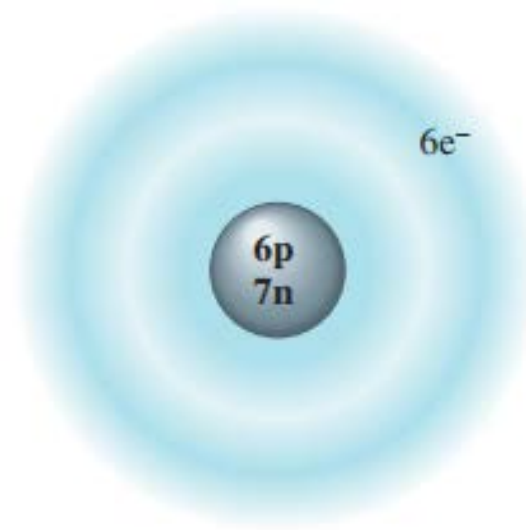
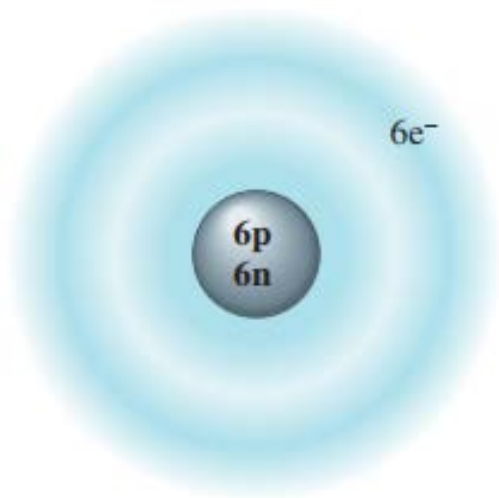


- Alpha – particle scattering from metal foils



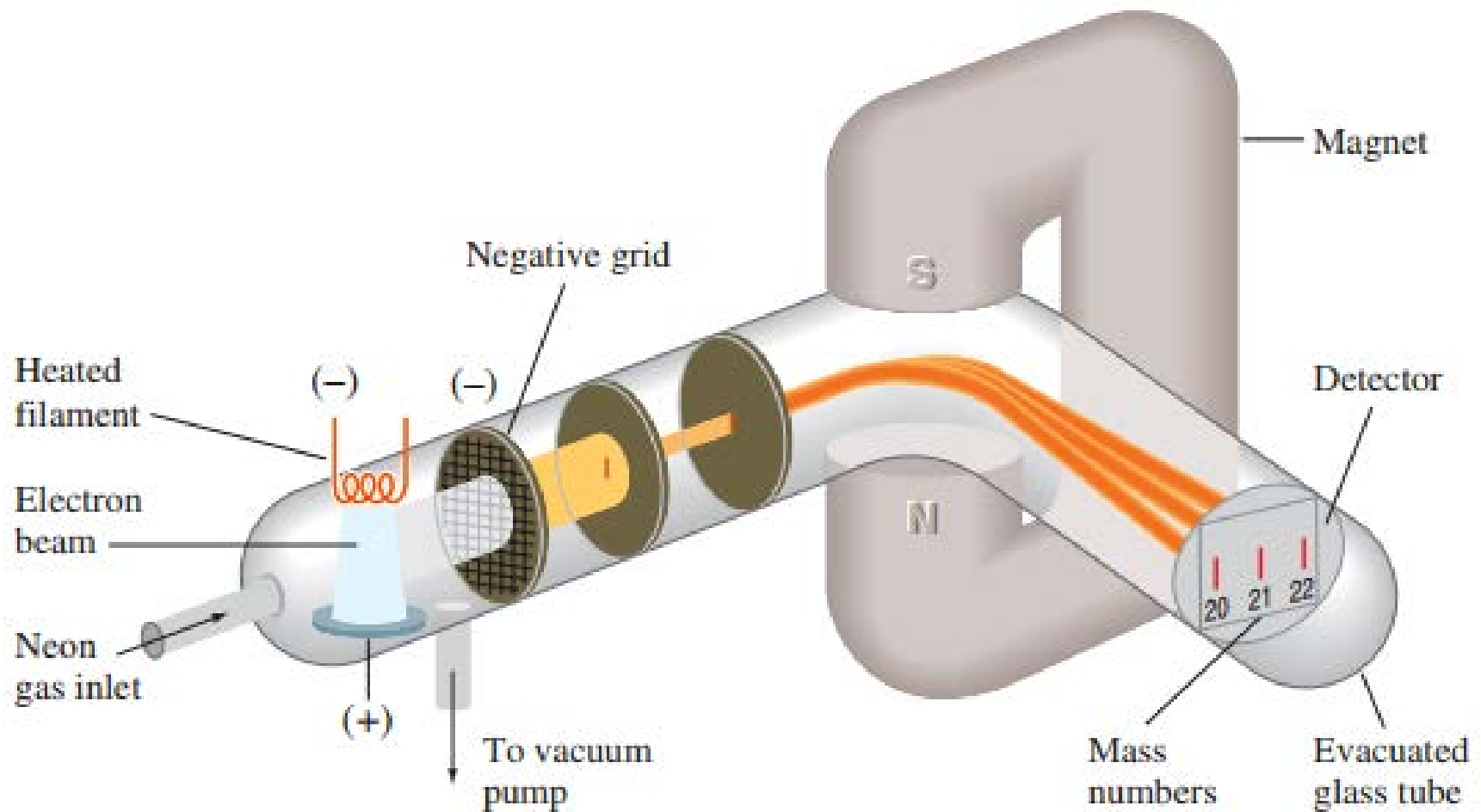
Representation of the scattering of alpha particles by a gold foil

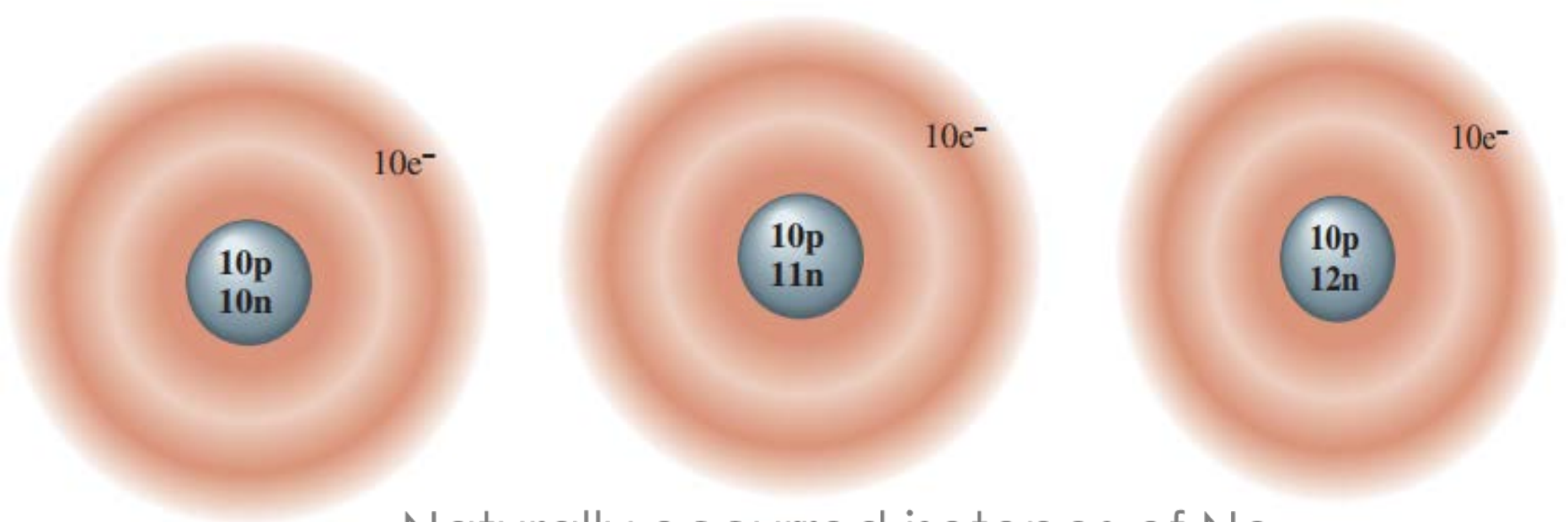
Particle	Mass (kg)	Charge (C)	Mass (amu)*	Charge (e)
Electron	9.10939×10^{-31}	-1.60218×10^{-19}	0.00055	-1
Proton	1.67262×10^{-27}	$+1.60218 \times 10^{-19}$	1.00728	+1
Neutron	1.67493×10^{-27}	0	1.00866	0



Mass number \longrightarrow ^{23}Na
 Atomic number \longrightarrow $_{11}$

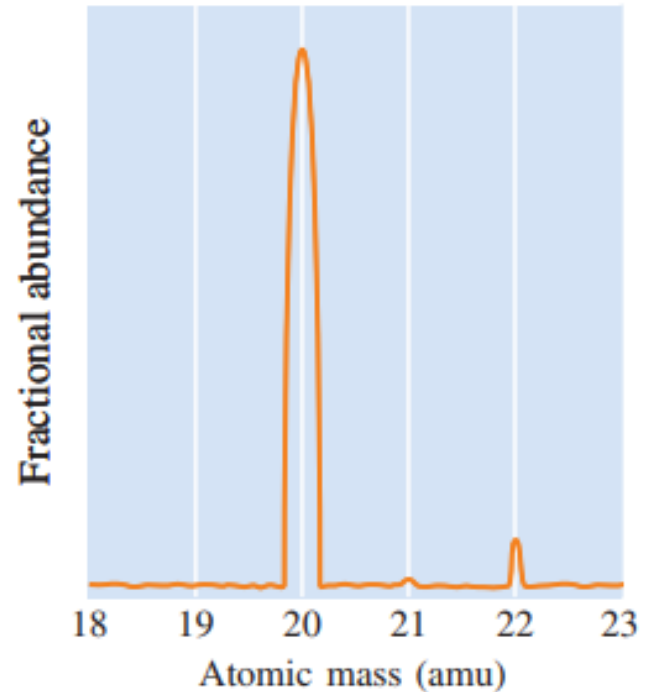
Simple mass spectrometer, showing the separation of neon isotopes





- Naturally occurred isotopes of Ne

- Mass spectrum of neon



Main-Group Elements

Main-Group Elements

1
H
1.00794
Atomic number
Symbol
Atomic mass

	1 IA		Transition Metals										13 IIIA					14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	1 H 1.00794	2 He 4.002602											5 B 10.811	6 C 12.0107	7 N 14.0067	8 O 15.9994	9 F 18.9984032	10 Ne 20.1797				
2	3 Li 6.941	4 Be 9.012182											13 Al 26.9815386	14 Si 28.0855	15 P 30.973762	16 S 32.065	17 Cl 35.453	18 Ar 39.948				
3	11 Na 22.98976928	12 Mg 24.3050	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8 VIII	9 VIII	10 VIII	11 IB	12 IIB	13 Al 26.9815386	14 Si 28.0855	15 P 30.973762	16 S 32.065	17 Cl 35.453	18 Ar 39.948				
4	19 K 39.0983	20 Ca 40.078	21 Sc 44.955912	22 Ti 47.867	23 V 50.9415	24 Cr 51.9961	25 Mn 54.938045	26 Fe 55.845	27 Co 58.933195	28 Ni 58.6934	29 Cu 63.546	30 Zn 65.409	31 Ga 69.723	32 Ge 72.64	33 As 74.92160	34 Se 78.96	35 Br 79.904	36 Kr 83.798				
5	37 Rb 85.4678	38 Sr 87.62	39 Y 88.90585	40 Zr 91.224	41 Nb 92.90638	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.90550	46 Pd 106.42	47 Ag 107.8682	48 Cd 112.411	49 In 114.818	50 Sn 118.710	51 Sb 121.760	52 Te 127.60	53 I 126.90447	54 Xe 131.293				
6	55 Cs 132.9054519	56 Ba 137.327	71 Lu 174.967	72 Hf 178.49	73 Ta 180.94788	74 W 183.84	75 Re 186.207	76 Os 190.23	77 Ir 192.217	78 Pt 195.084	79 Au 196.966569	80 Hg 200.59	81 Tl 204.3833	82 Pb 207.2	83 Bi 208.98040	84 Po (209)	85 At (210)	86 Rn (222)				
7	87 Fr (223)	88 Ra (226)	103 Lr (262)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Ds (281)	111 Rg (272)	112 Uub (285)	113 Uut (284)	114 Uuq (289)	115 Uup (288)	116 Uuh (291)	118 Uuo (294)					



Metal



Metalloid



Nonmetal

Lanthanides

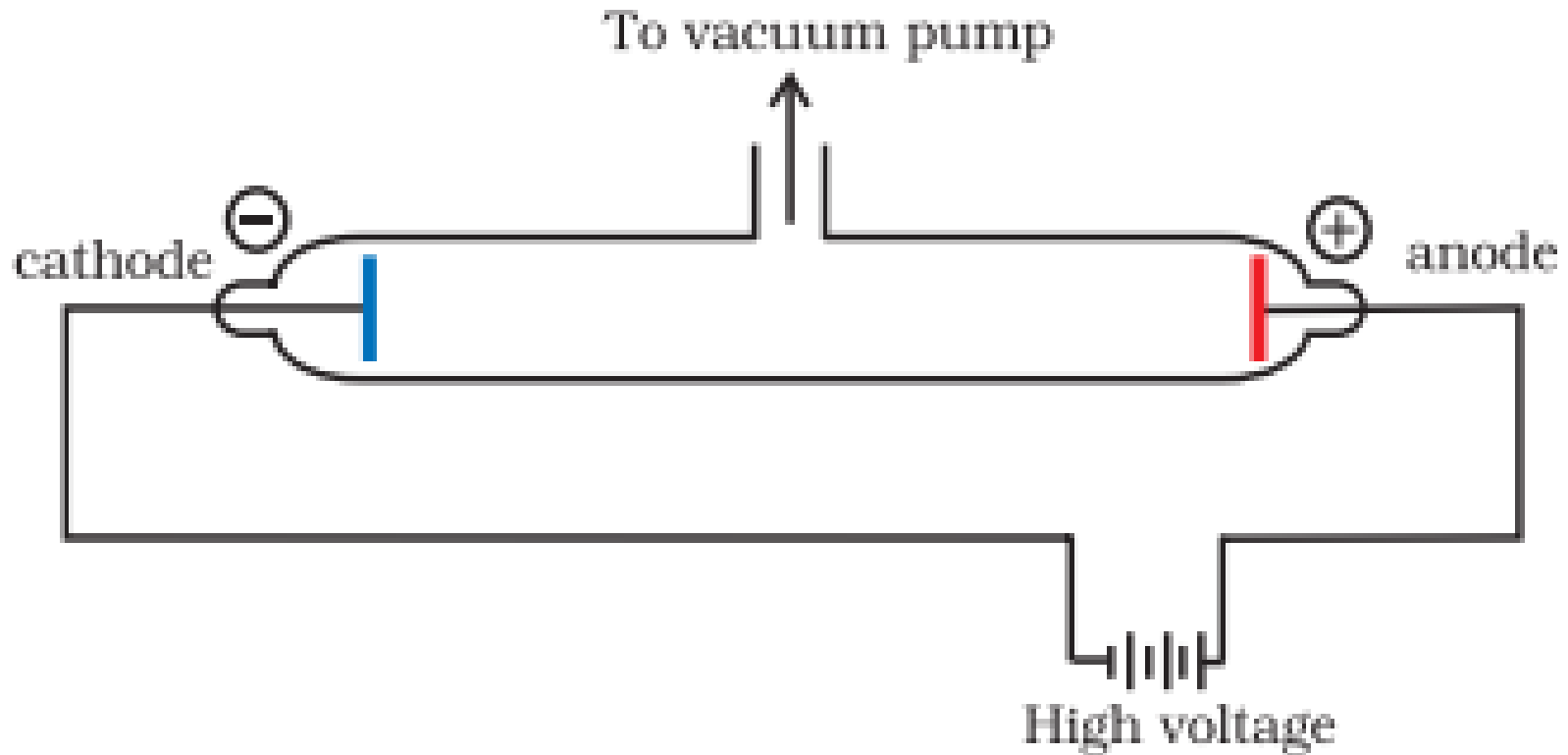
Actinides

Inner Transition Metals

57 La 138.90547	58 Ce 140.116	59 Pr 140.90765	60 Nd 144.244	61 Pm (145)	62 Sm 150.36	63 Eu 151.964	64 Gd 157.25	65 Tb 158.92535	66 Dy 162.500	67 Ho 164.93032	68 Er 167.259	69 Tm 168.93421	70 Yb 173.04
89 Ac (227)	90 Th 232.03806	91 Pa 231.03588	92 U 238.02891	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)

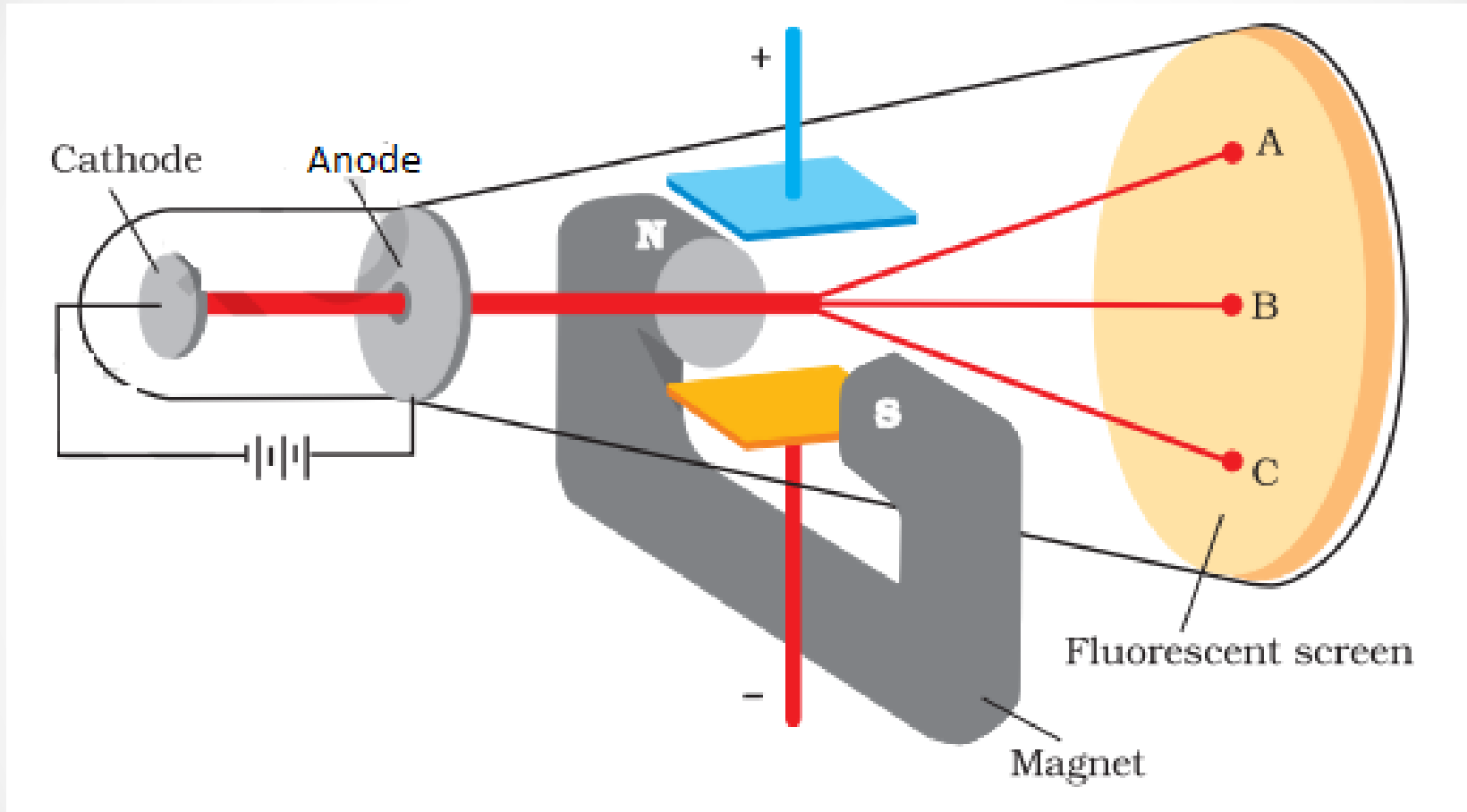
SUB-ATOMIC PARTICLES

Discovery of Electron



A cathode ray discharge tube

Charge to Mass Ratio of Electron

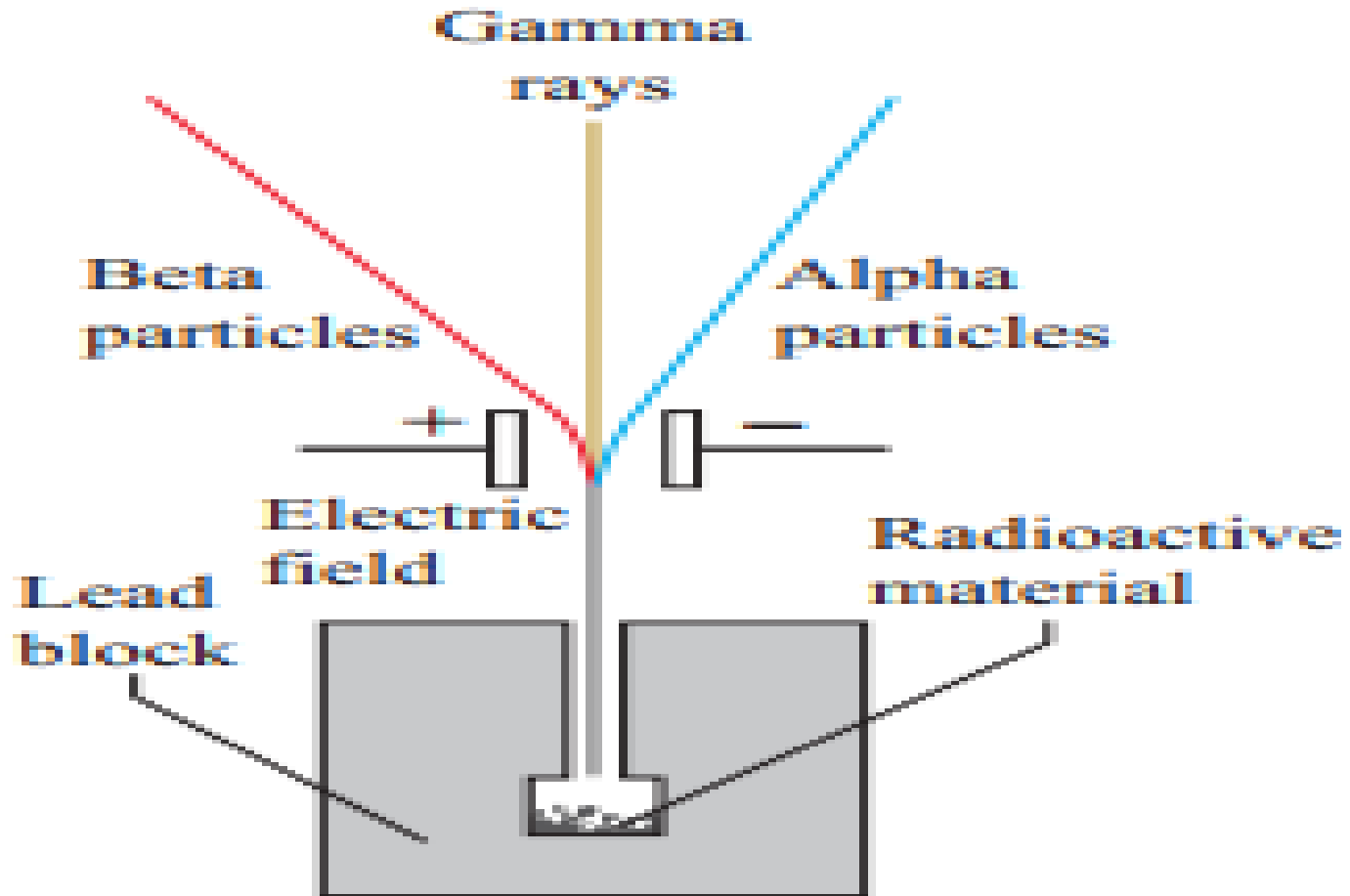


The apparatus to determine the charge to the mass ratio of electron

TOWARDS QUANTUM MECHANICAL MODEL OF THE ATOM

1. Dual behavior of matter,
2. Heisenberg uncertainty principle

X-Rays and Radioactivity



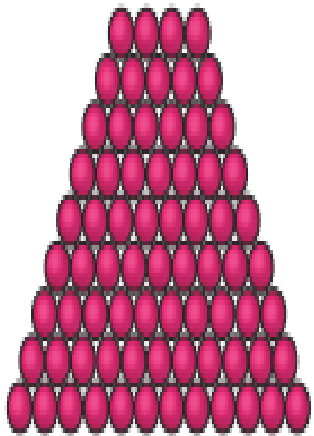
Three types of radiation from radioactive materials

The Concept of the Mole and the Avogadro Constant

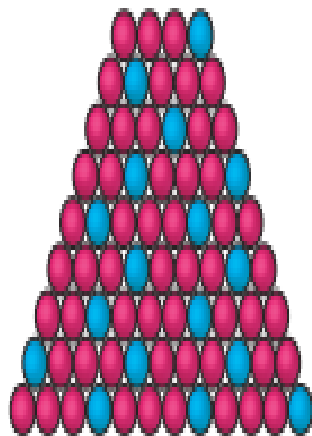
$$N_A = 6.02214179 \times 10^{23} \text{ mol}^{-1}$$

Year	Avogadro's Number
1986	6.0221367×10^{23}
1998	$6.02214199 \times 10^{23}$
2002	6.0221415×10^{23}
2006	$6.02214179 \times 10^{23}$

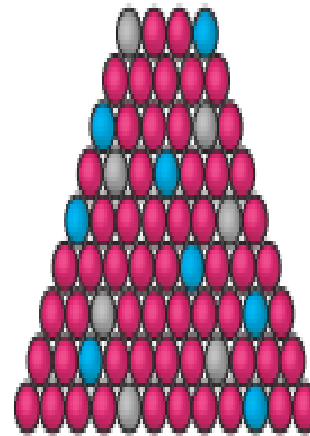
Distribution of isotopes in four elements



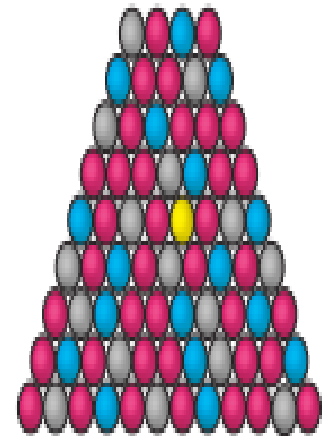
(a) 6.02214×10^{23} F atoms
= 18.9984 g



(b) 6.02214×10^{23} Cl atoms
= 35.4527 g



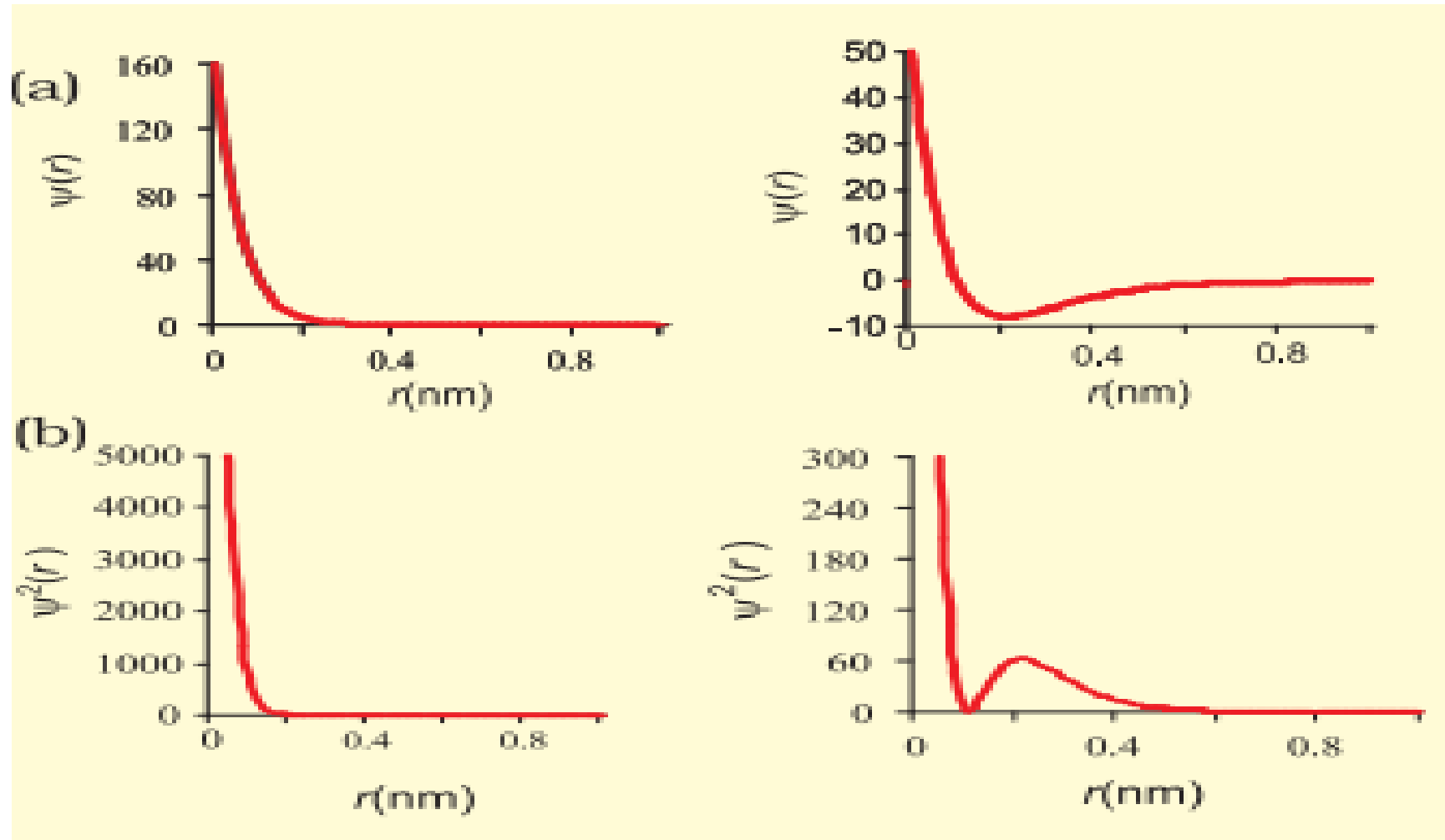
(c) 6.02214×10^{23} Mg atoms
= 24.3050 g



(d) 6.02214×10^{23} Pb atoms
= 207.2 g

Orbit, orbital and its importance

Shapes of Atomic Orbitals



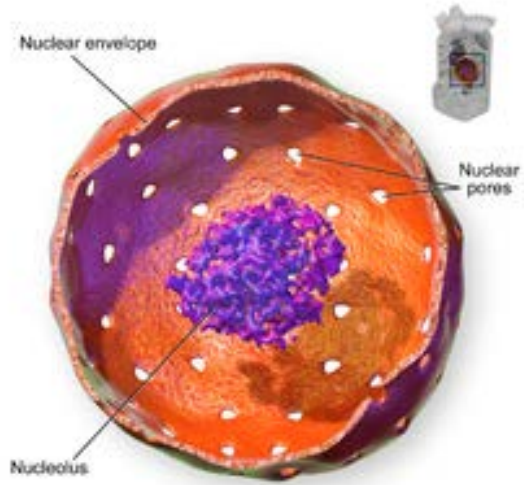
Electronic Configuration of Atoms

In the next six elements-boron (B, $1s^2 2s^2 2p^1$), carbon (C, $1s^2 2s^2 2p^2$), nitrogen (N, $1s^2 2s^2 2p^3$), oxygen (O, $1s^2 2s^2 2p^4$), fluorine (F, $1s^2 2s^2 2p^5$) and neon (Ne, $1s^2 2s^2 2p^6$), the 2p orbitals get progressively filled. This process is completed with the neon atom. The orbital picture of these elements can be represented as follows :

Li	$\uparrow\downarrow$	\uparrow			
Be	$\uparrow\downarrow$	$\uparrow\downarrow$			
B	$\uparrow\downarrow$	$\uparrow\downarrow$	\uparrow		
C	$\uparrow\downarrow$	$\downarrow\uparrow$	\uparrow	\uparrow	
N	$\uparrow\downarrow$	$\uparrow\downarrow$	\uparrow	\uparrow	\uparrow
O	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	\uparrow	\uparrow
F	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	\uparrow
Ne	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$
	1s	2s	2p		

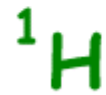
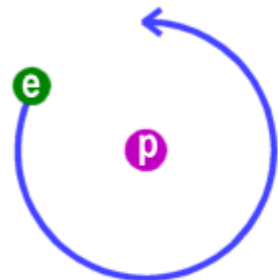
List of the Atomic Theories

- Ancient Greek Beliefs
- Dalton's Theory
- J.J. Thomson's Theory
- Rutherford's Hypothesis
- Bohr's Theory
- Einstein, Heisenberg and Quantum Mechanics
- Quark Theory

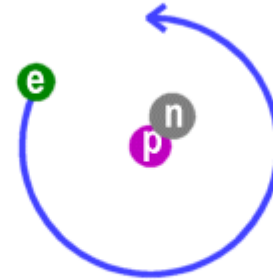


Nucleus

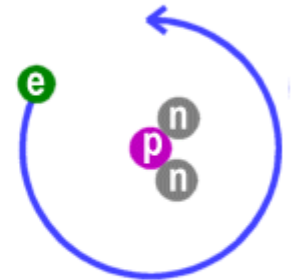
Three Isotopes of Hydrogen



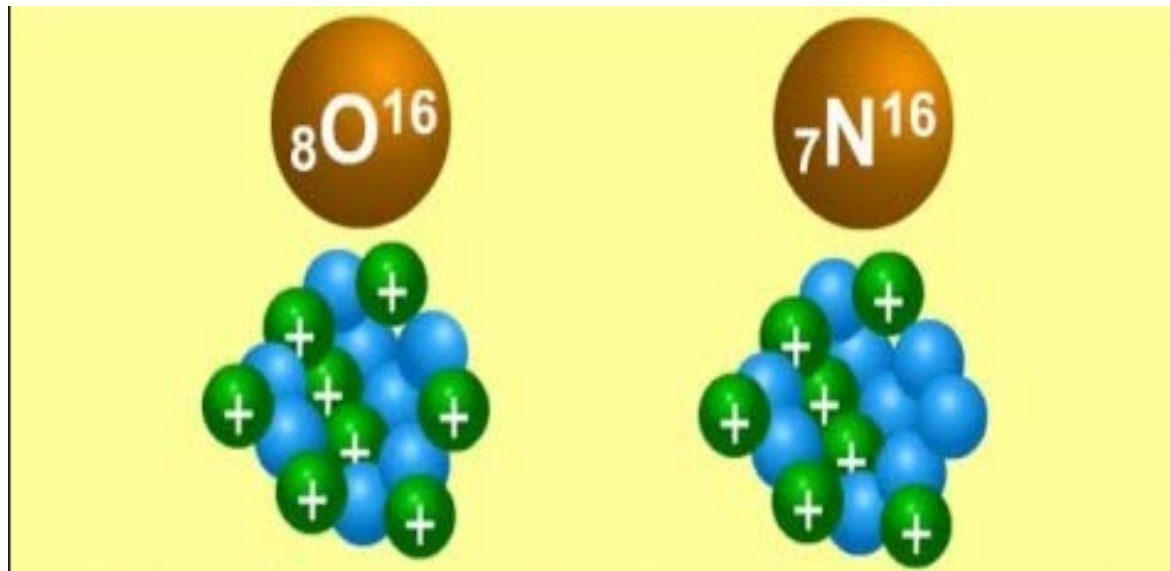
Protium



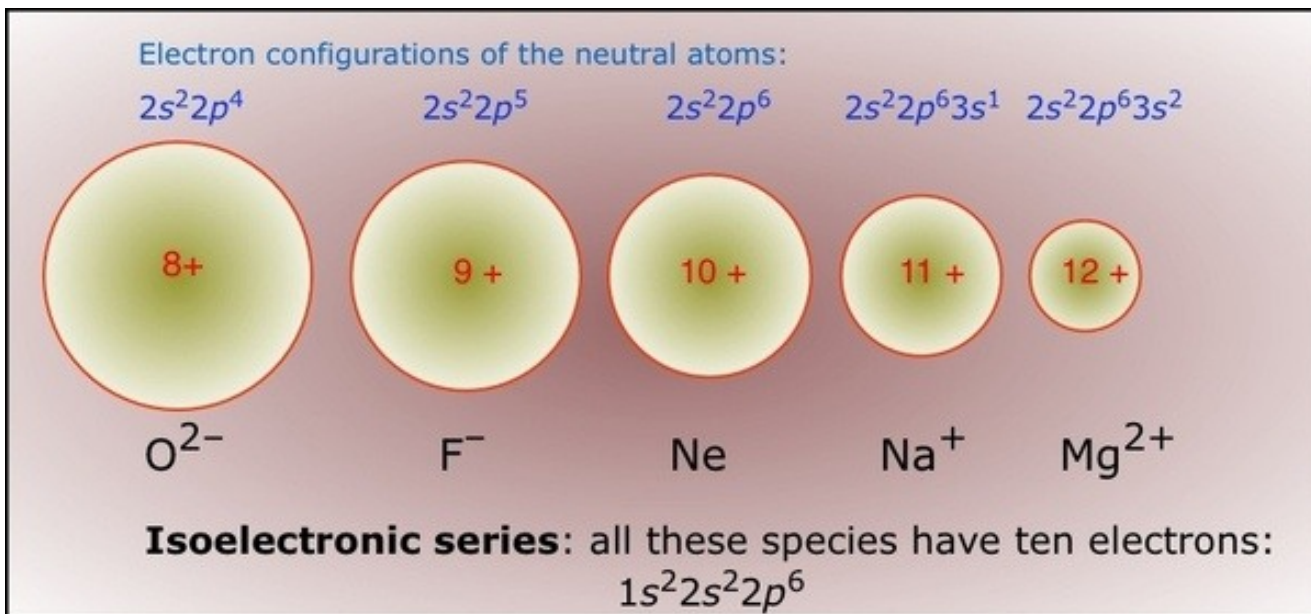
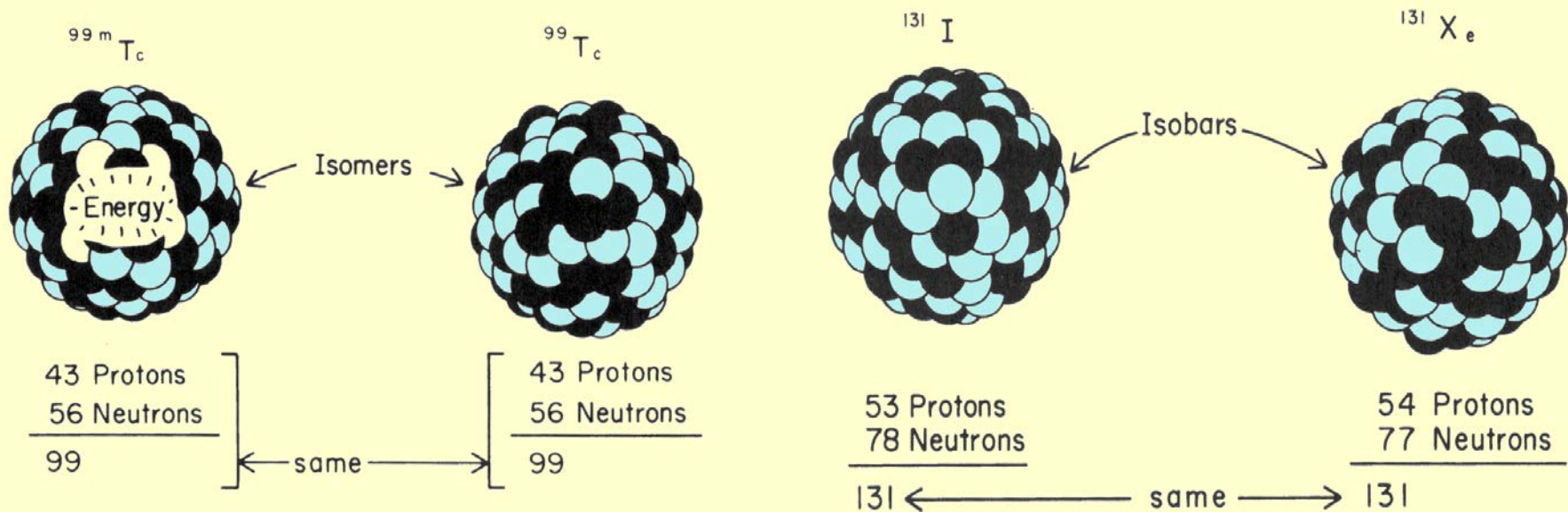
Deuterium



Tritium



Isotones



azizochka1964@gmail.com