

LESSON 7.1: Development of the Periodic Table

1869: Dimitri Mendeleev

- Originally organized elements based upon _____
- Elements with similar properties were supposed to be in the same _____ (up and down)

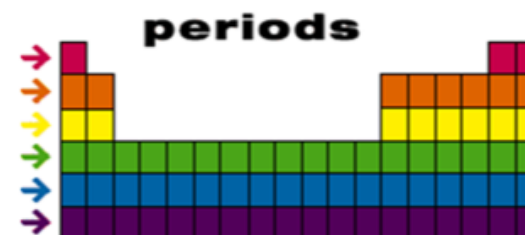
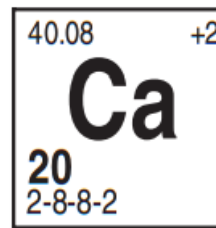
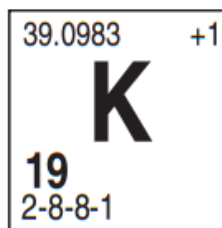
1914: Henry Moseley

- Developed the _____
- Organized elements by _____ (# of protons)
- Created the Periodic Law which states, “Properties of elements are periodic functions of their atomic numbers.”
- This means –
 - The Result...

Organization of the Periodic Table

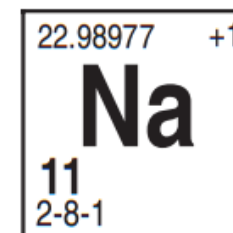
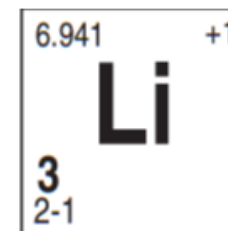
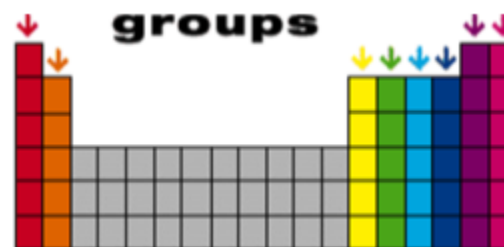
Periods

- Period number = _____



Groups

- Same group means same _____
- resulting in _____



Guided Notes: Unit 7 Periodic Table

Reactivity of Elements

○

○

○

Example: Which two elements have similar chemical properties and why? *Na, K, Li, Be*

Period		1	
1	1	1.00794	1.1
		H	
		Group	
		1	2
2	3	6.941	9.01218
		Li	Be
3	11	22.989769	24.304
		Na	Mg
4	19	39.0983	40.078
		K	Ca

LESSON 7.2: Categories & Properties of Elements

Quick Definitions (helpful for later)

☆ Electronegativity –

☆ Ionization Energy–

NEED TO KNOW!

Metals, Nonmetals, and Metalloids

1 H Hydrogen																	2 He Helium				
3 Li Lithium	4 Be Beryllium															5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium															13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton				
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon				
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon				
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110	111	112	113	114								

Periodic Table of the Elements

1 H Hydrogen	2 He Helium																		
3 Li Lithium	4 Be Beryllium																	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium																	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton	37 Rb Rubidium	38 Sr Strontium
39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon	55 Cs Cesium	56 Ba Barium	57 La Lanthanum	58 Ce Cerium
59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum
79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon	87 Fr Francium	88 Ra Radium	89 Ac Actinium	90 Th Thorium	91 Pa Protactinium	92 U Uranium	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	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	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson

Groups

Periods

Metals:

Metalloids:

Nonmetals:

PRACTICE!

Name: _____

1. On the present Periodic Table of the Elements, the elements are arranged according to increasing

- | | |
|---------------------------|-------------------|
| (1) # of oxidation states | (3) atomic mass |
| (2) # of neutrons | (4) atomic number |

2. The properties of elements are periodic functions of their

- | | |
|-------------------|--------------------|
| (1) mass numbers | (3) atomic radii |
| (2) atomic masses | (4) atomic numbers |

3. Bromine has chemical properties most similar to

- | | |
|---------------|-------------|
| (1) fluorine | (3) krypton |
| (2) potassium | (4) mercury |

4. Which element is in Group 2 and Period 7 of the Periodic Table?

- | | |
|---------------|------------|
| (1) magnesium | (3) radium |
| (2) manganese | (4) radon |

5. In which shell are the valence electrons of the elements in Period 2 found?

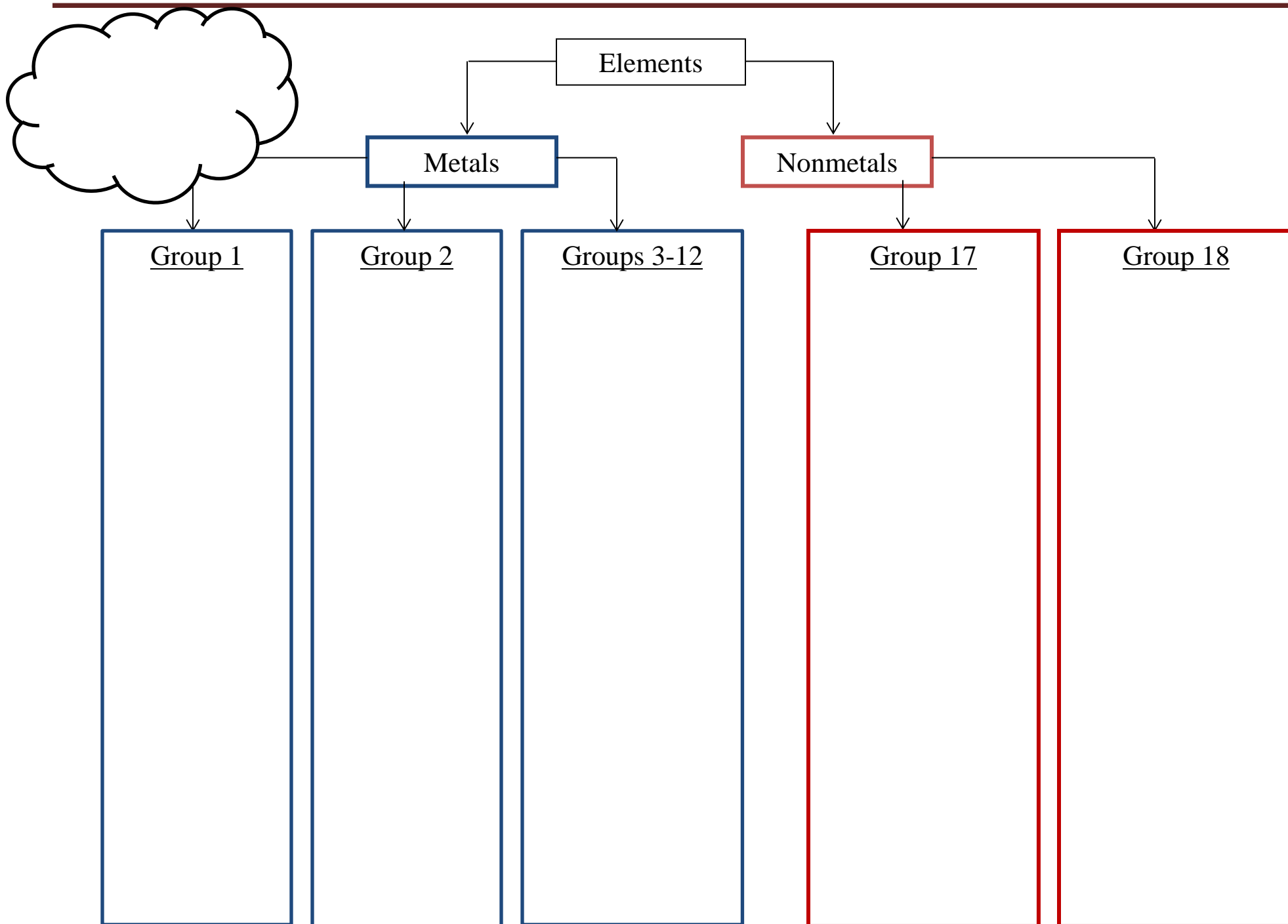
- | | | | |
|-------|-------|-------|-------|
| (1) 1 | (2) 2 | (3) 3 | (4) 4 |
|-------|-------|-------|-------|

6. The atoms of the elements in Group 2 have the same

- | | |
|-------------------|---------------------|
| (1) mass number | (3) # of protons |
| (2) atomic number | (4) # of valence e- |

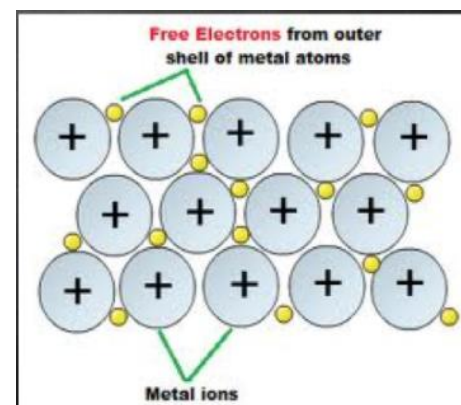
7. In which list are the elements arranged in order of increasing atomic mass?

- | | |
|----------------|---------------|
| (1) Cl, K, Ar | (3) Te, I, Xe |
| (2) Fe, Co, Ni | (4) Ne, F, Na |



PROPERTIES OF METALS

-
-
-
-
-
-



What makes metals malleable & ductile?

Metals & Metal Alloys

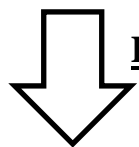
PROPERTIES OF METALLOIDS

B 5 10.81 +3					
Al	Si 14 28.086 +4 -4				
	Ge 32 72.64 +4 -4	As 33 74.92 +3 +5 -3 -5			
		Sb 51 121.76 +3 +5 -3 -5	Te 52 127.60 +4 +6 -2 -4 -6		
			Po	At 85 +5 -3 -5 -7	

PROPERTIES OF NONMETALS

Periodic Trends

LESSON 7.3: Periodic Trends DOWN A GROUP



Down a Group (Don't Guess – Check Table S!)

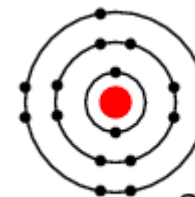
-Number of energy levels

-Nuclear charge

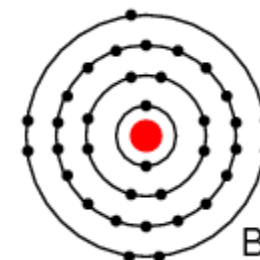
-Atomic radius (size of the atom)



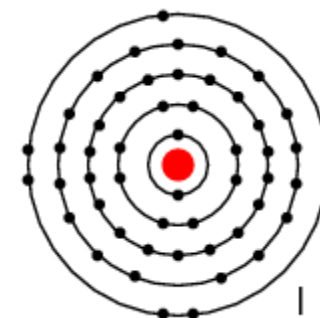
F



Cl



Br



I

Guided Notes: Unit 7 Periodic Table

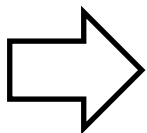
-Ionization energy (how much energy it takes to lose valence e-)

-Electronegativity (how strongly an atom attracts e-)

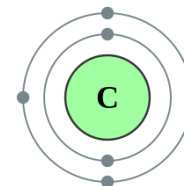
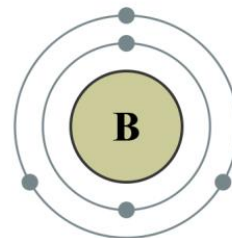
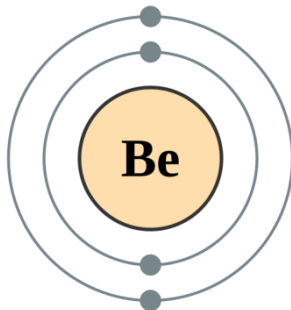
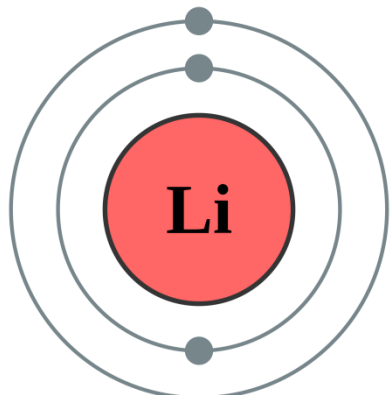
★ What is Electron Shielding?

-Metallic character (how much it acts like a metal/how easily it loses e-)

LESSON 7.4: Periodic Trends ACROSS A PERIOD



Across a Period (Don't Guess – Check Table S!)



-Number of energy levels

-Nuclear charge

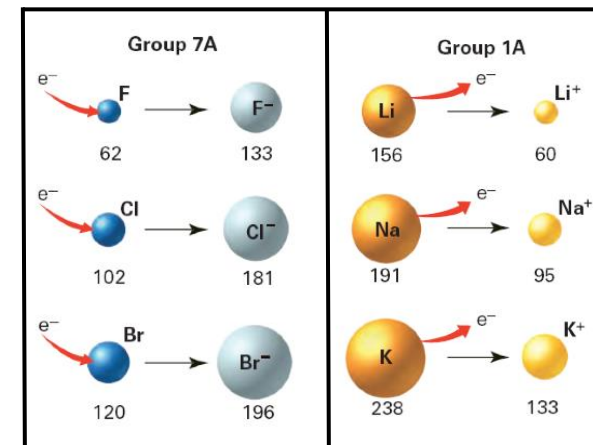
-Atomic radius (size of the atom)

Ionic vs. Atomic Radius

○ Ion Size: Nonmetals

○ Ion Size: Metals

○ Comparing Ionic & Atomic Radii



-Ionization energy (how much energy it takes to lose valence e^-)

-Electronegativity (how strongly an atom attracts e-)

-Metallic character (how much it acts like a metal/how easily it loses e-)

Best Metal on the Periodic Table: _____

Best Nonmetal on the Periodic Table: _____

Guided Notes: Unit 7 Periodic Table

Periodic Table Graphic Organizer

Atomic Radius

Across a Period

Ionization Energy

Electronegativity

Why?

Down a Group

Atomic Radius

Ionization Energy

Electronegativity

Why?

Same group means same...

Alkali Metals

Alkaline Earth Metals

Transition Metals

Same period means same...

Purpose of this?

Reactivity of metals?

Reactivity of nonmetals?

Nonmetals:

- ____ I.E.
- ____ electronegativity
- ____ e-
- Form ____ ions
- ____ conductors
- ____ (not shiny)
- ____ (not bendy)
- ____ ionic radius

Phases at STP:

Gases: ____

Liquids: ____ and ____

Solids: Everything else

Metals:

- ____ I.E.
- ____ electronegativity
- ____ e-
- Form ____ ions
- ____ conductors
- ____ (shiny)
- ____ (bendy)
- ____ (stretchy)
- ____ ionic radius

* Lant

** Ac

hydrogen 1 1.0079 H																	helium 2 4.0026 He						
lithium 3 6.941 Li	beryllium 4 9.0122 Be																	boron 5 10.811 B	carbon 6 12.011 C	nitrogen 7 14.007 N	oxygen 8 15.999 O	fluorine 9 18.998 F	neon 10 20.180 Ne
sodium 11 22.990 Na	magnesium 12 24.305 Mg																	aluminum 13 26.982 Al	silicon 14 28.086 Si	phosphorus 15 30.974 P	sulfur 16 32.06 S	chlorine 17 35.453 Cl	argon 18 39.948 Ar
potassium 19 39.098 K	calcium 20 40.078 Ca	scandium 21 44.956 Sc	titanium 22 47.867 Ti	vanadium 23 50.942 V	chromium 24 51.996 Cr	manganese 25 54.938 Mn	iron 26 55.845 Fe	cobalt 27 58.933 Co	nickel 28 58.693 Ni	copper 29 63.546 Cu	zinc 30 65.38 Zn							gallium 31 69.723 Ga	germanium 32 72.61 Ge	arsenic 33 74.922 As	selenium 34 78.96 Se	bromine 35 79.904 Br	krypton 36 83.80 Kr
rubidium 37 85.468 Rb	strontium 38 87.62 Sr	yttrium 39 88.906 Y	zirconium 40 91.224 Zr	niobium 41 92.906 Nb	molybdenum 42 95.94 Mo	technetium 43 [98] Tc	ruthenium 44 101.07 Ru	rhodium 45 102.91 Rh	palladium 46 106.42 Pd	silver 47 107.87 Ag	cadmium 48 112.41 Cd	indium 49 114.82 In	tin 50 118.71 Sn	antimony 51 121.76 Sb	tellurium 52 127.60 Te	iodine 53 126.90 I	xenon 54 131.29 Xe						
caesium 55 132.91 Cs	barium 56 137.33 Ba	lanthanum 57 138.91 La	hafnium 58 178.49 Hf	tantalum 59 180.95 Ta	tungsten 60 183.84 W	rhenium 61 186.21 Re	osmium 62 190.23 Os	iridium 63 192.22 Ir	platinum 64 195.08 Pt	gold 65 196.97 Au	mercury 66 200.59 Hg	thallium 67 204.38 Tl	lead 68 207.2 Pb	bismuth 69 208.98 Bi	polonium 70 [209] Po	astatine 71 [210] At	radon 72 [222] Rn						
francium 87 [223] Fr	radium 88 [226] Ra	actinium 89 [227] Ac	rutherfordium 104 [261] Rf	dubnium 105 [262] Db	seaborgium 106 [266] Sg	bohrium 107 [264] Bh	hassium 108 [269] Hs	meitnerium 109 [268] Mt	unnilium 110 [271] Uun	ununium 111 [272] Uuu	unubium 112 [277] Uub												
		neodymium 60 144.24 Nd	promethium 61 [145] Pm	samarium 62 150.36 Sm	europium 63 151.96 Eu	gadolinium 64 157.25 Gd	terbium 65 158.93 Tb	dysprosium 66 162.50 Dy	holmium 67 164.93 Ho	erbium 68 167.26 Er													
		uranium 92 238.03 U	neptunium 93 [237] Np	plutonium 94 [244] Pu	americium 95 [243] Am	curium 96 [247] Cm	berkelium 97 [247] Bk	californium 98 [251] Cf	einsteinium 99 [252] Es	fermium 100 [257] Fm													