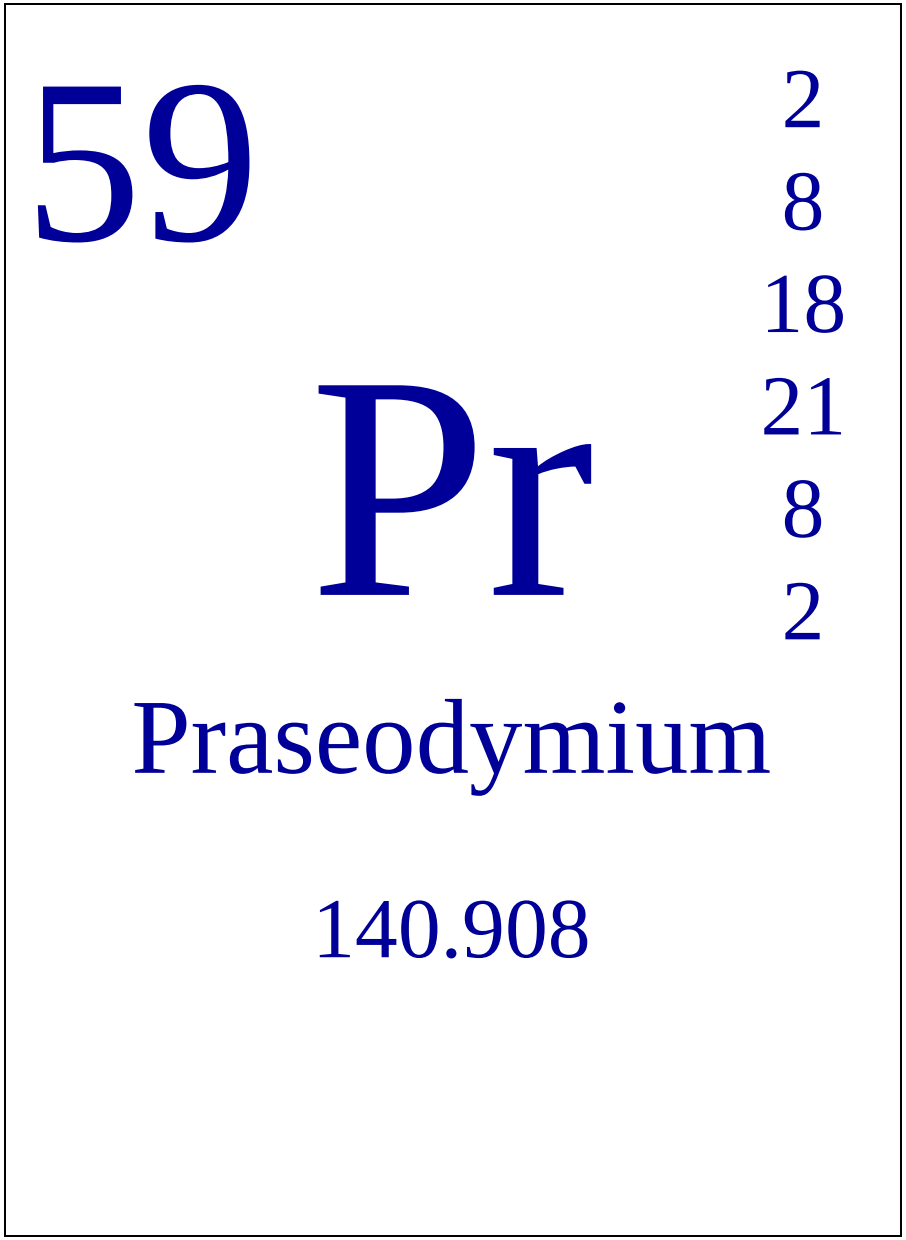
The Periodic Scrabble Tile of Chemistry

how to read the periodic table…


59
2
8
18
21
8
2
Pr
6
Praseodymium
140.908

Chemical/Element Symbol: Capital letter followed by a lower-case letter if necessary.

Pr

Be careful!

Co is cobalt

CO is carbon monoxide

59

2
8
18
21
8
2

Pr

6

Praseodymium

140.908

59

2
8
18
21
8
2

Pr

6

Praseodymium

Chemical/Element Name

140.908

59

2
8
18
21
8
2

Pr

6

Praseodymium

140.908

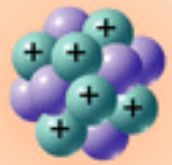
59

Atomic Number: the number of protons in the nucleus

Isotopes…

- Atoms of the same elements (that have the same number of protons) that have different numbers of neutrons
- ex: some atoms of Cl have 18 neutrons while others have 20 neutrons
- both are isotopes of chlorine
  - both have 17 protons
- Pennies…

Isotopes of Carbon…

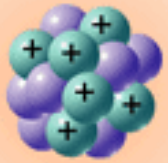


6e⁻

Carbon-12

6 Protons
6 Neutrons
6 Electrons

$^{12}_{6}C$

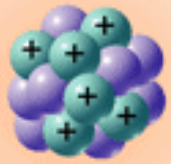


6e⁻

Carbon-13

6 Protons
7 Neutrons
6 Electrons

$^{13}_{6}C$



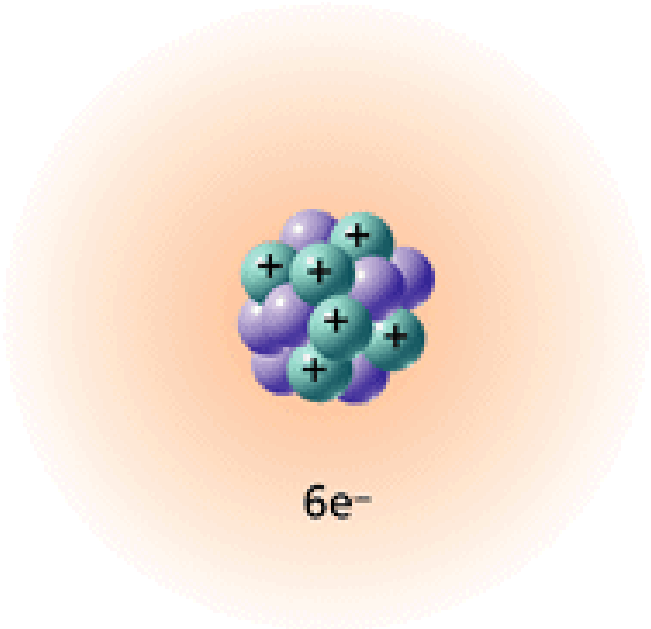
6e⁻

Carbon-14

6 Protons
8 Neutrons
6 Electrons

$^{14}_{6}C$

Atomic Mass *(Mass Number)*



- mass of the nucleus (protons + neutrons)
- measured in amu (atomic mass units)
- protons & neutrons have a mass of ~1 amu
- 1 amu = 1.6605×10^{-24}g

59

2
8
18
21
8
2

6

Pr

Praseodymium

140.908

Atomic Mass:
the *average** mass of the nucleus

140.908

*average mass of all *isotopes* of the element and their relative abundances

59

2
8
18
21
8
2

Pr

6

Praseodymium

140.908

Electron Configuration: shows the number of electrons in each energy level

2
8
18
21
8
2

59
Pr
Praseodymium
140.908

59

Pr

Praseodymium

140.908

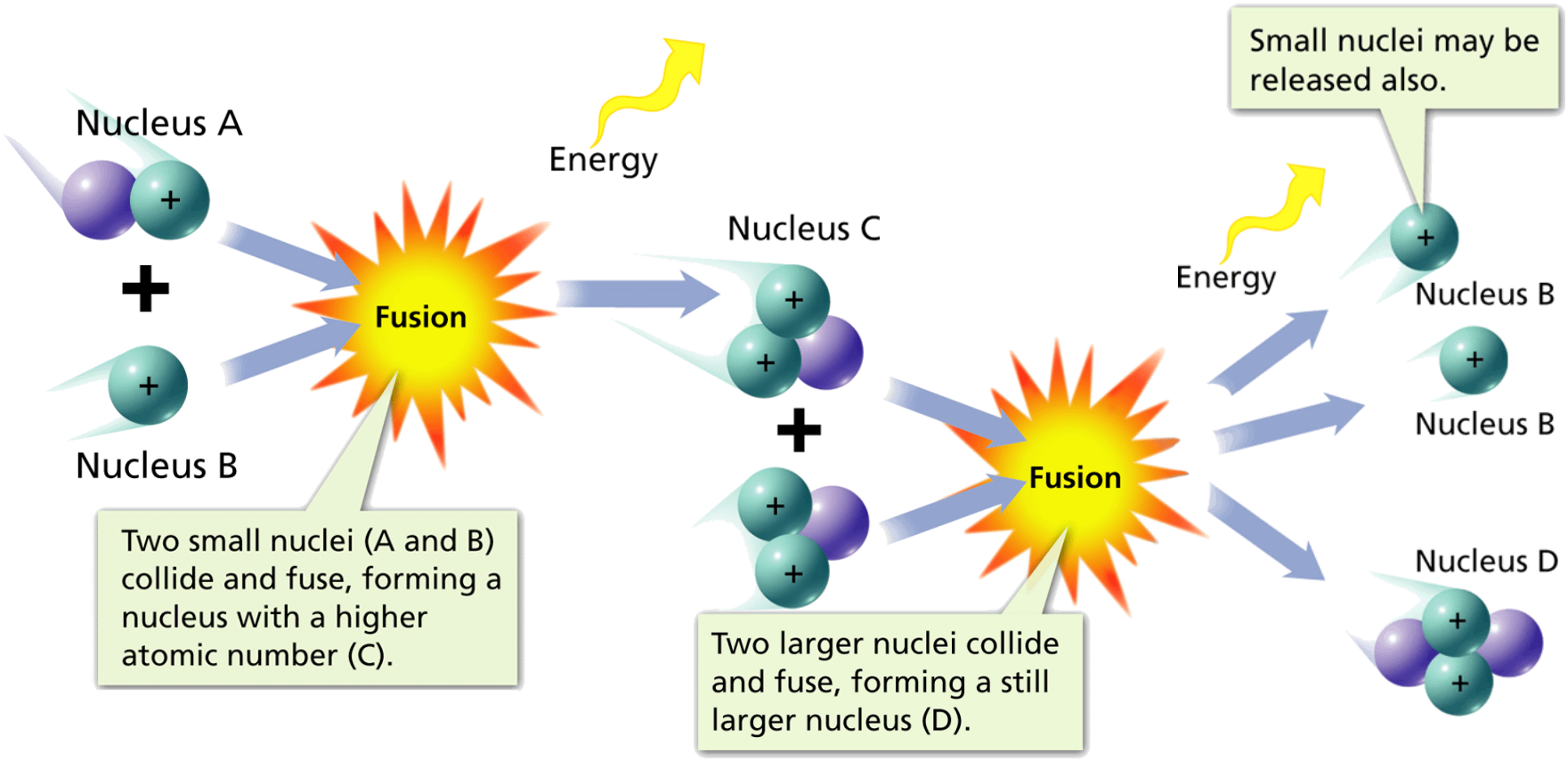
6

2
8
18
21
8
2

6

Period number: tells the number of energy levels of the element

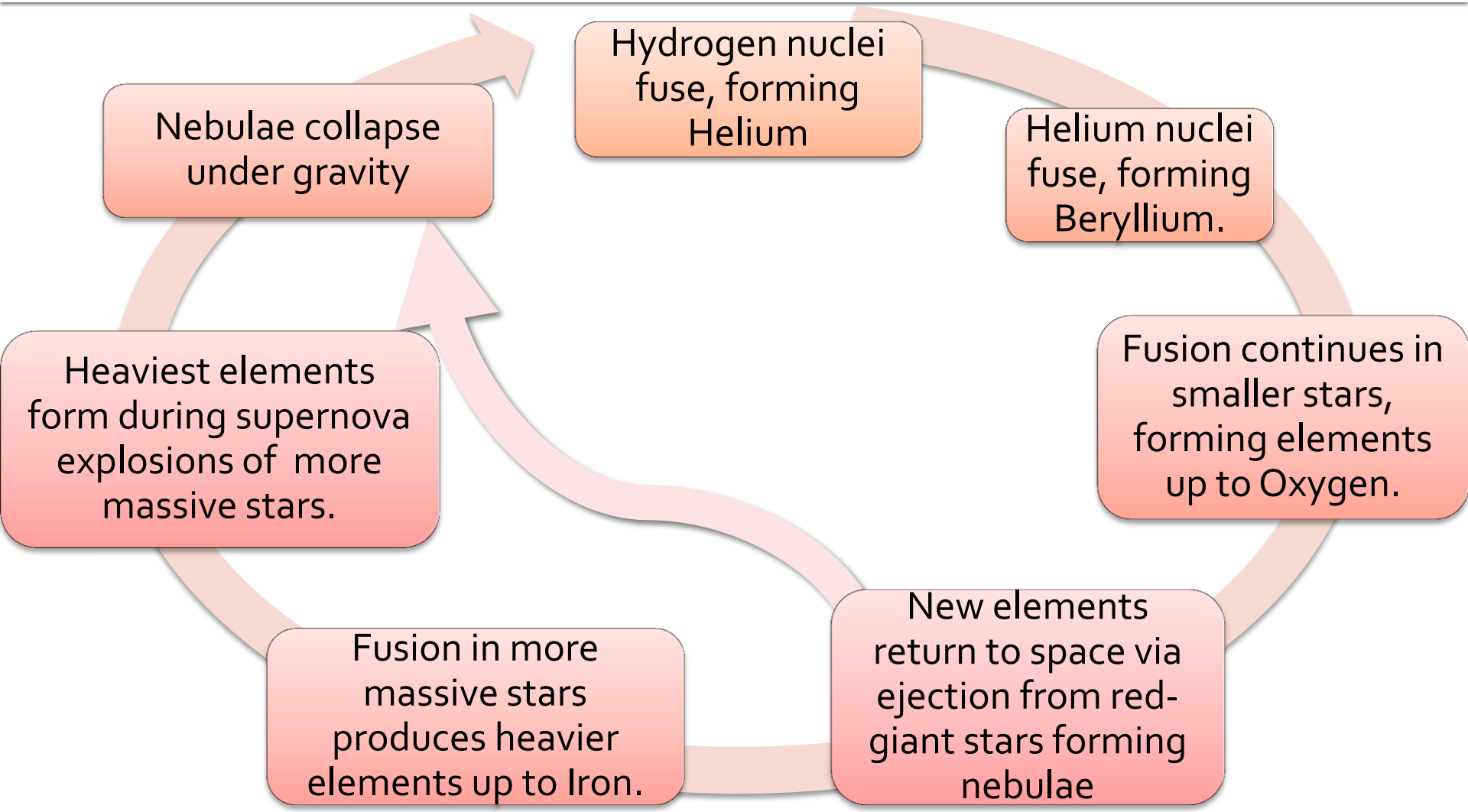
How Elements Form in Stars



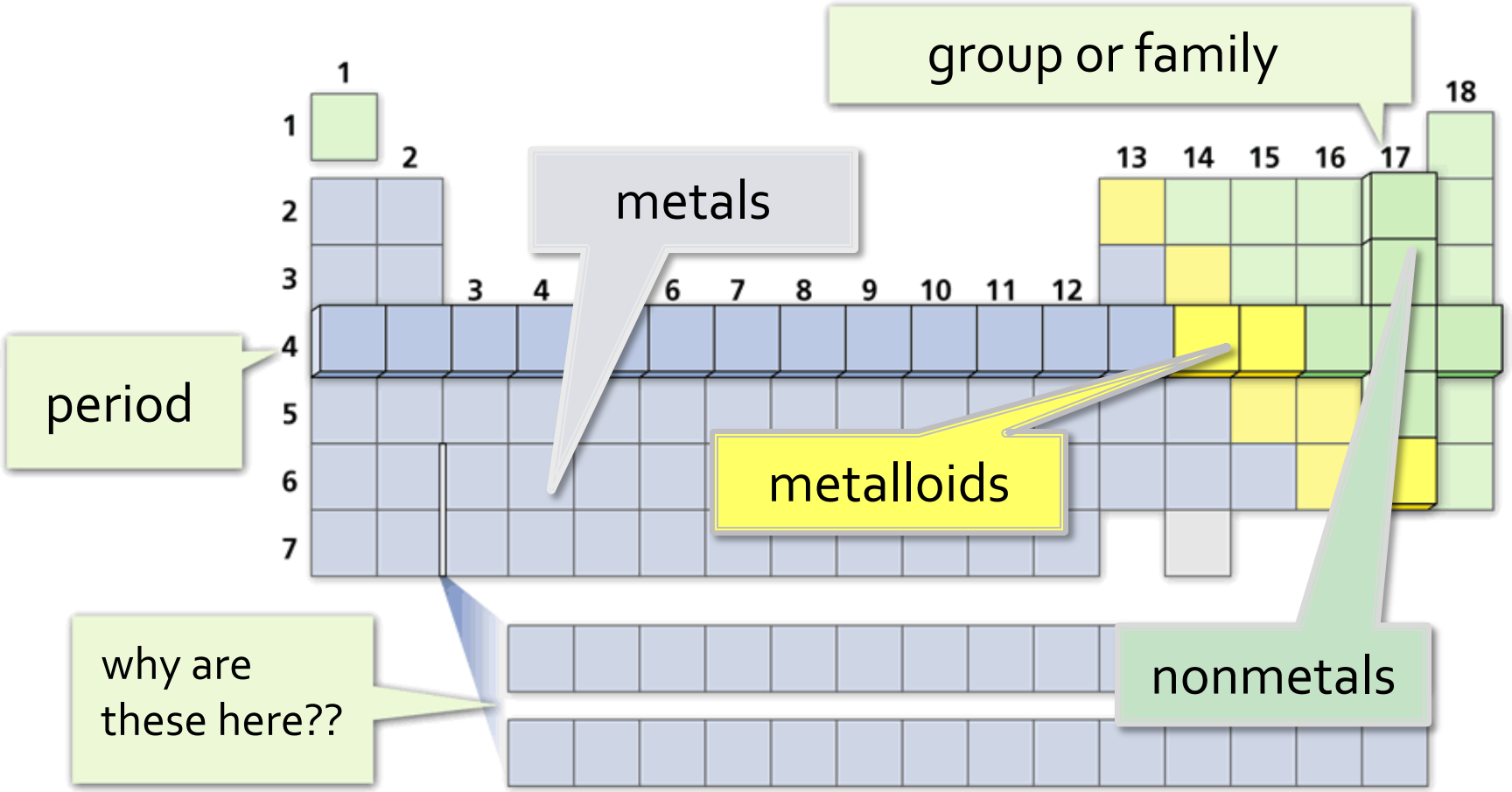
sagan

- "Except for hydrogen and helium every atom in the sun and the Earth was synthesized in other stars.
  The silicon in the rocks, the oxygen in the air, the carbon in our DNA the gold in our banks, the uranium in our arsenals were all made thousands of light-years away and billions of years ago.
  Our planet, our society and we ourselves are built…"

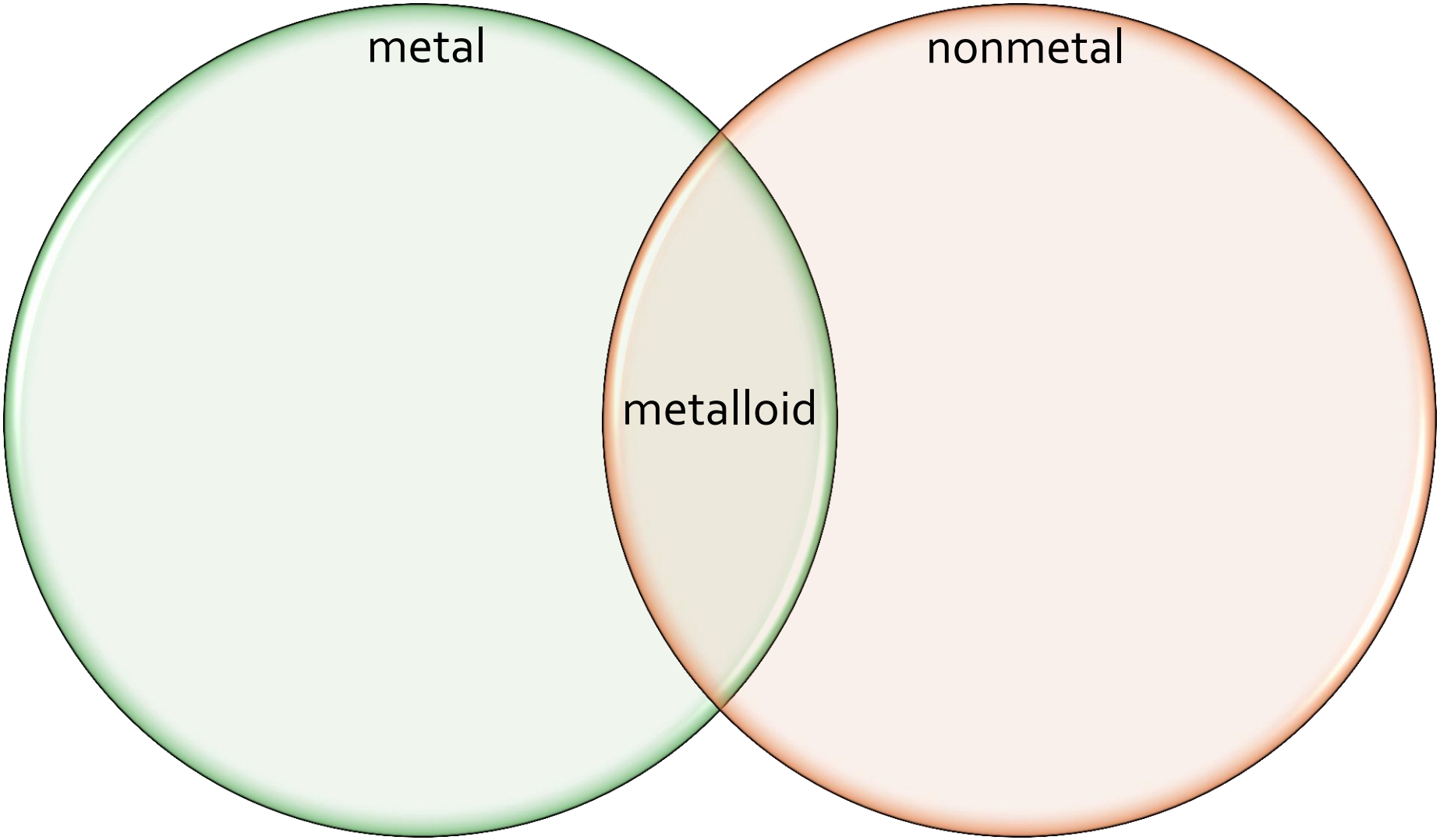
"…of star stuff."



Period vs Group/Metal vs Nonmetal

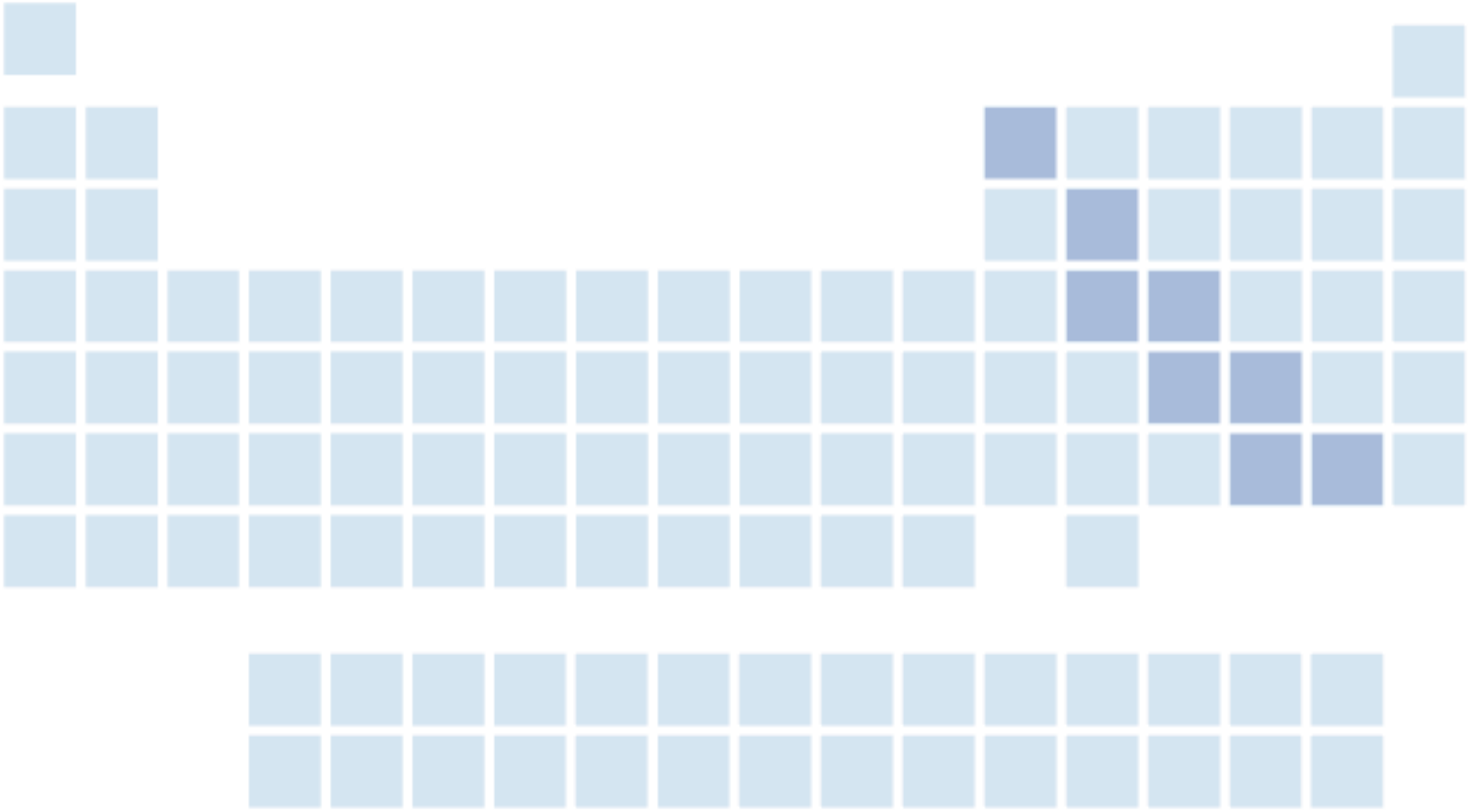


Metal vs Nonmetal

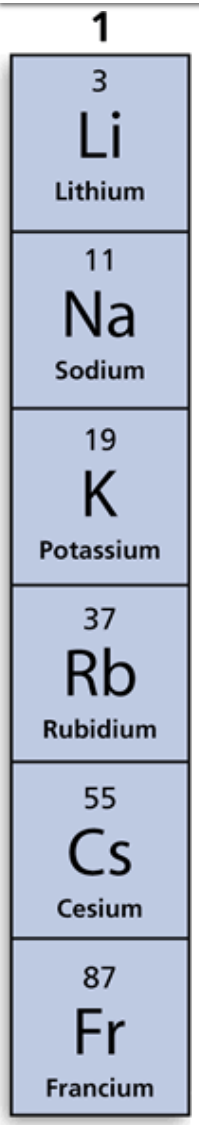


The Metalloids

- have some characteristics of both metals and nonmetals

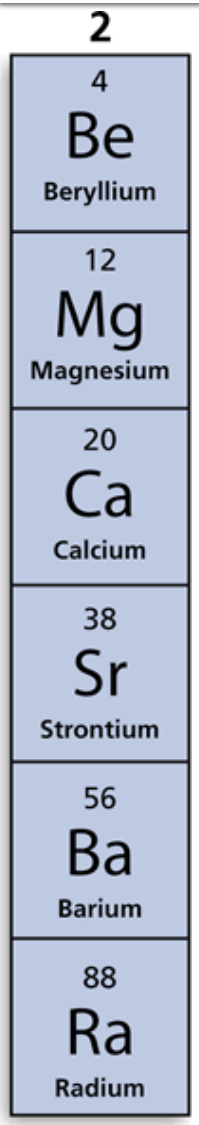


alkali metals



- combine with atoms of other elements by losing one electron.
- are VERY reactive!

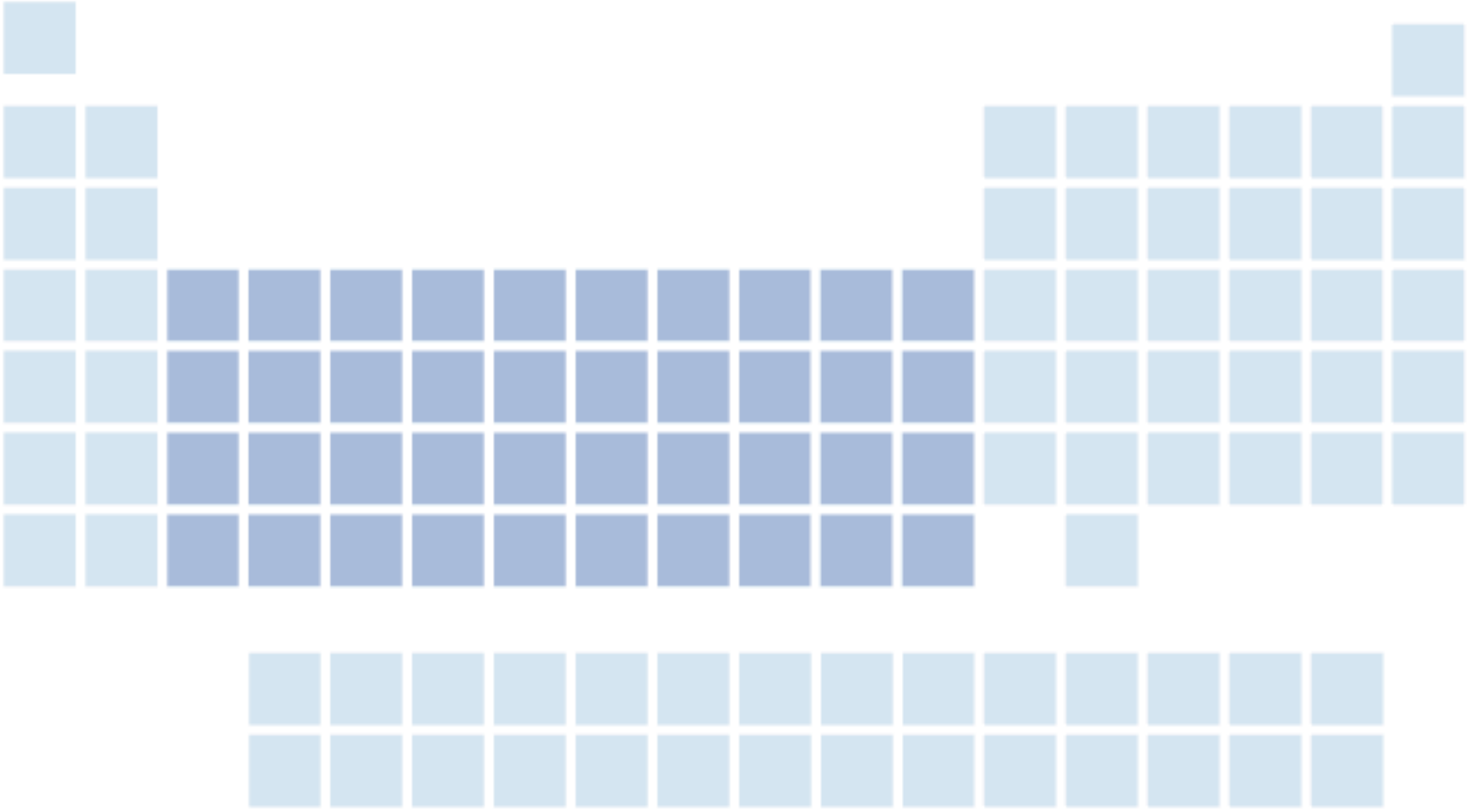
alkaline earth metals



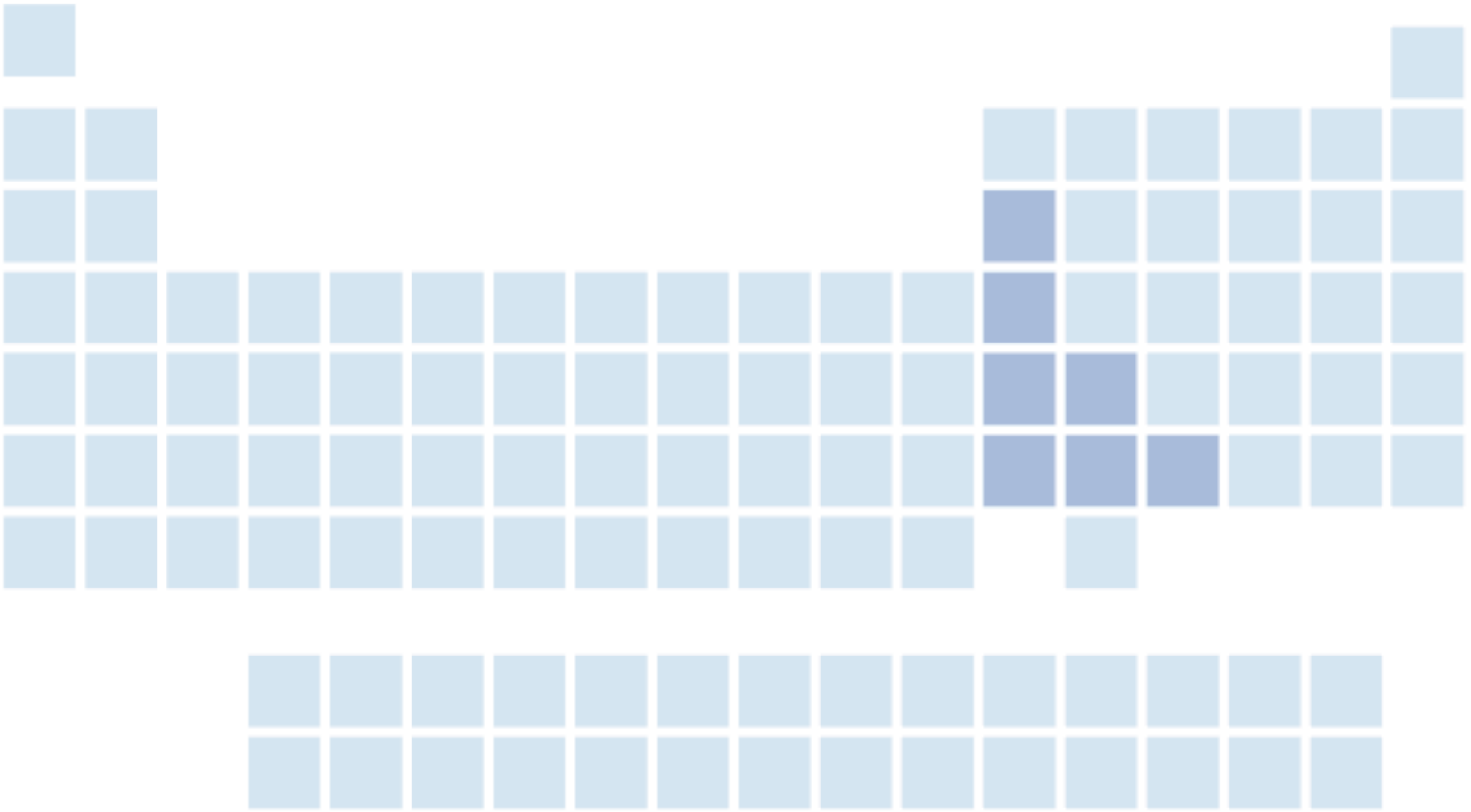
- not as reactive as the metals in Group 1
- more reactive than most other metals

transition metals

- less reactive than the metals in Groups 1 and 2. (see a pattern here??!)

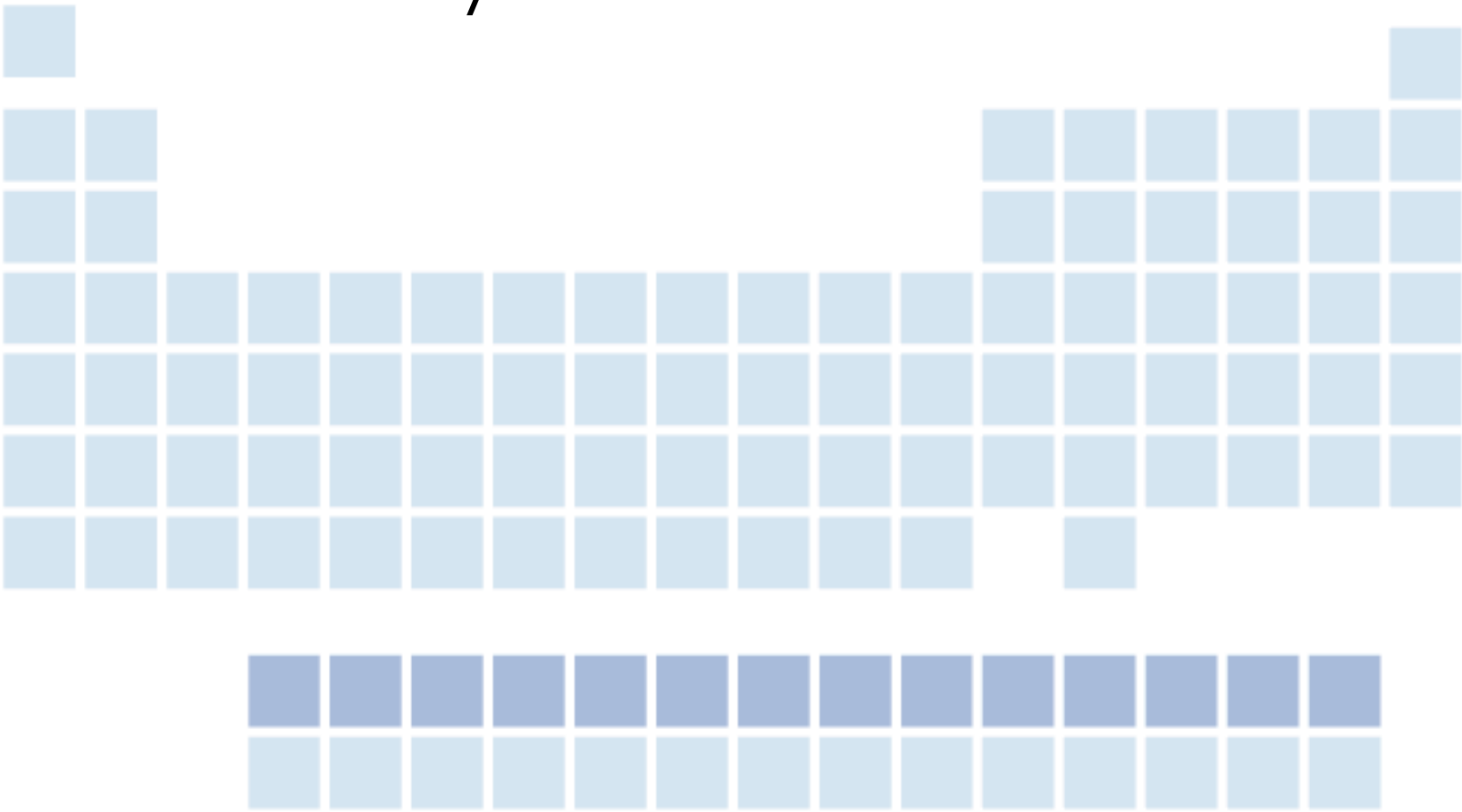


- Less reactive still!



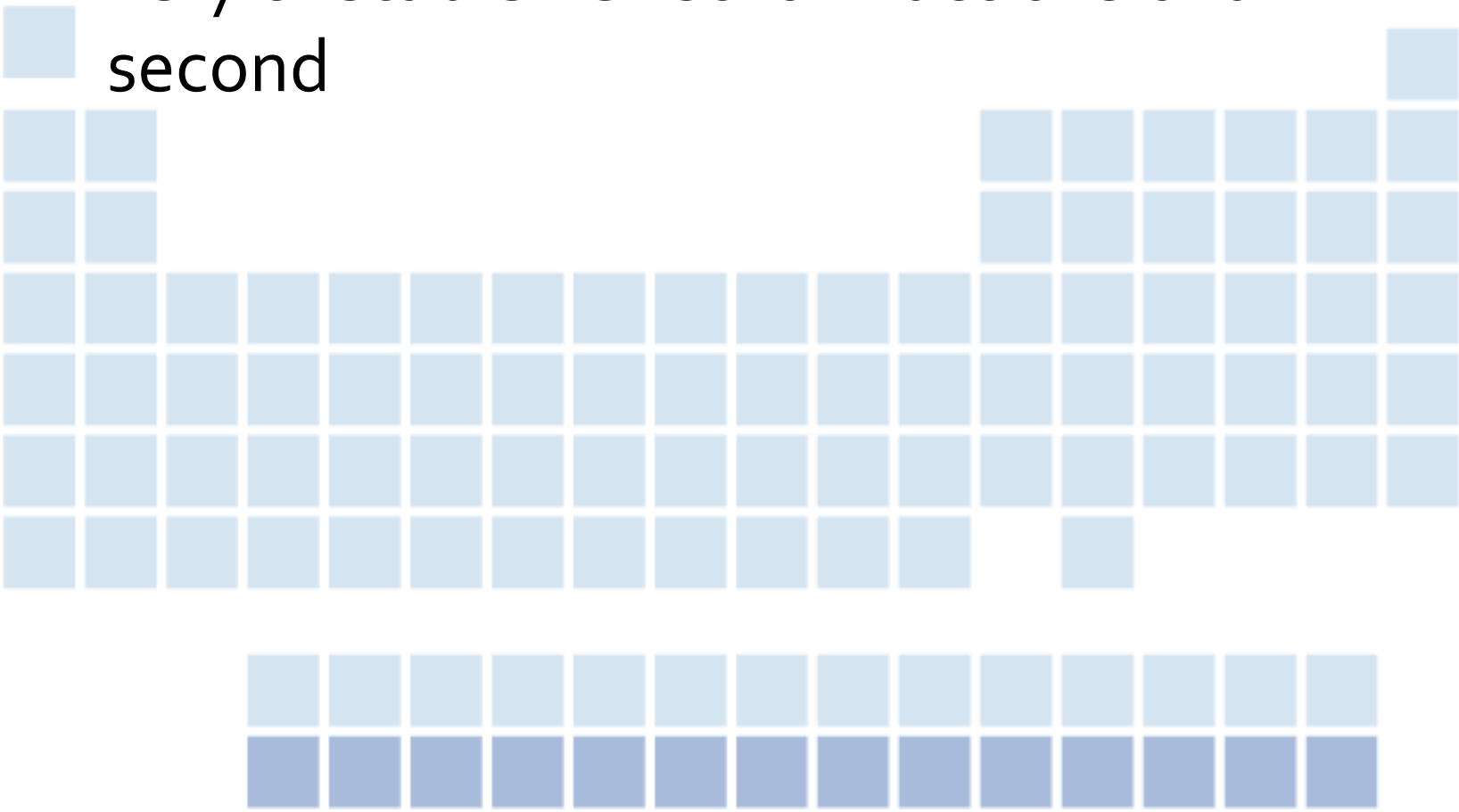
lanthanide metals

- soft, malleable, shiny metals with high conductivity.



actinide metals

- most are synthetic
- very unstable - exist for fractions of a second

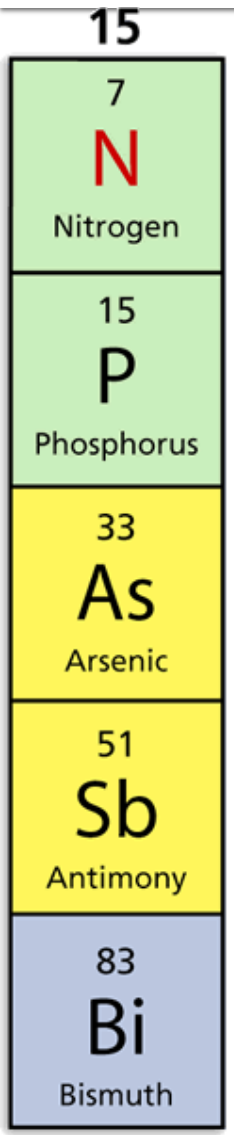


Families of Nonmetals

14

6
C
Carbon
14
Si
Silicon
32
Ge
Germanium
50
Sn
Tin
82
Pb
Lead

- carbon family has atoms that can gain, lose, or share 4electrons when reacting (why is this good?!)

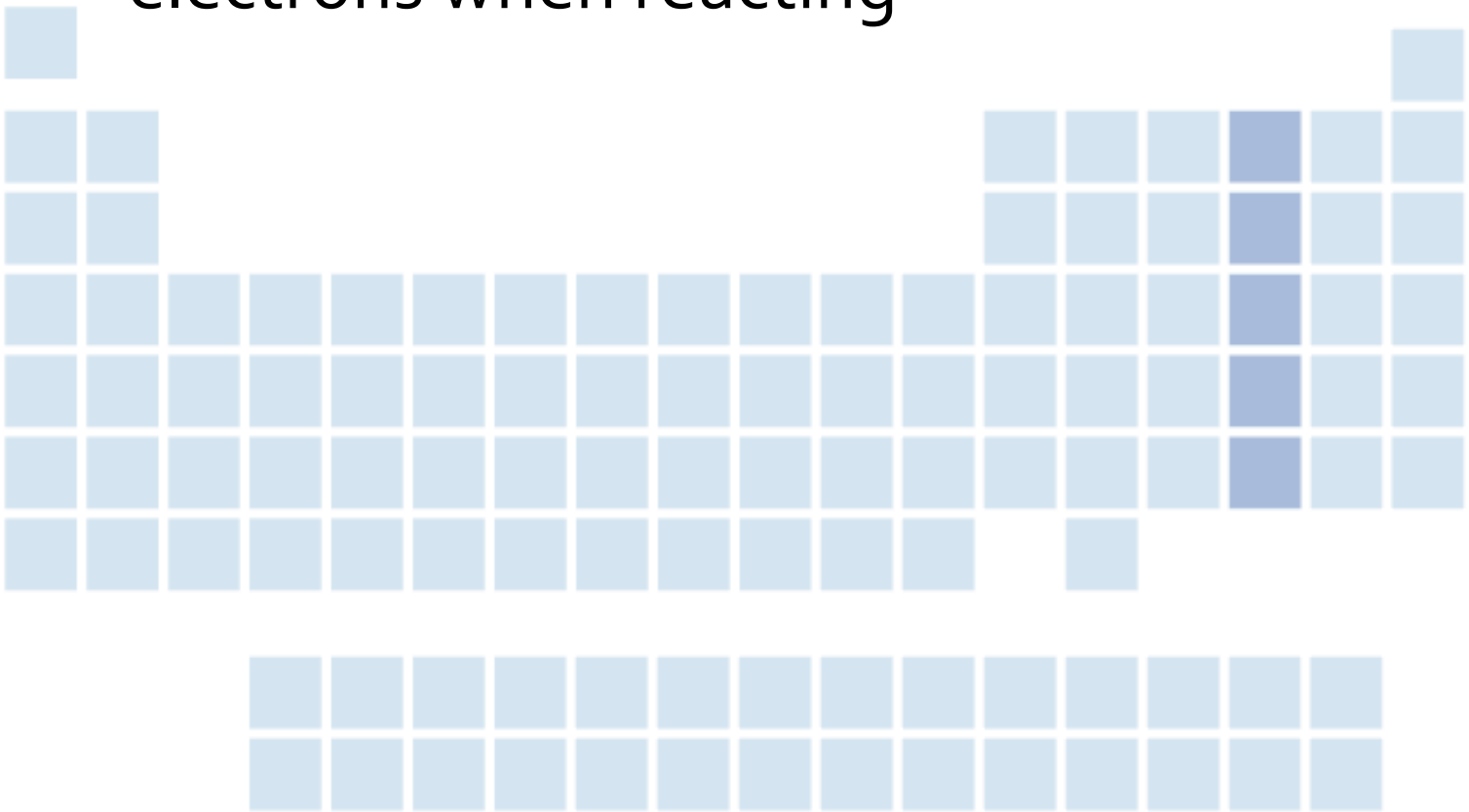


- nitrogen family contains 2 nonmetals
- usually gain or share three electrons when reacting

16

8
O
Oxygen
16
S
Sulfur
34
Se
Selenium
52
Te
Tellurium
84
Po
Polonium

- oxygen family contains three nonmetals
- These elements usually gain or share two electrons when reacting

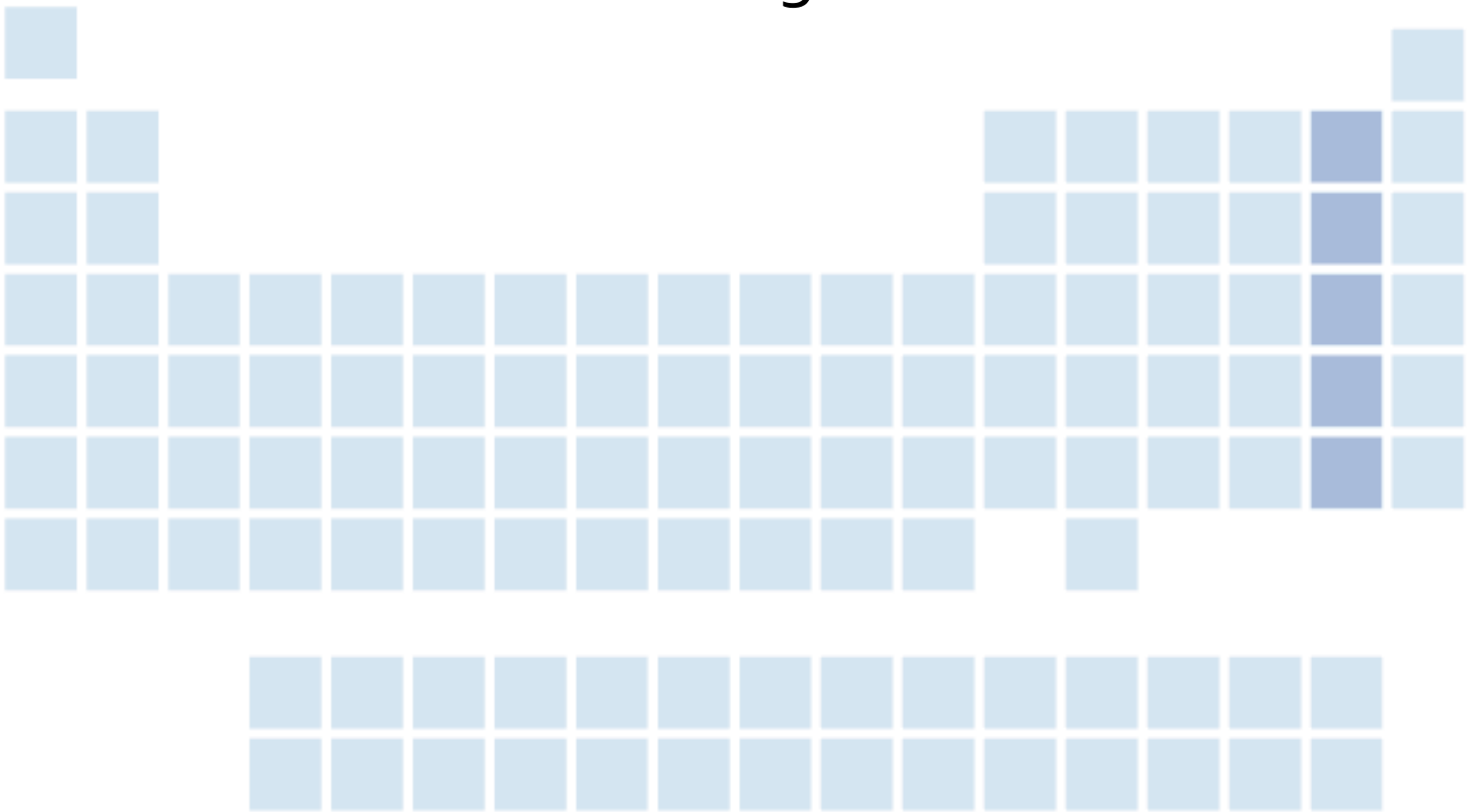


halogens

17

9
F
Fluorine
17
Cl
Chlorine
35
Br
Bromine
53
I
Iodine
85
At
Astatine

- most reactive nonmetals
- form compounds by sharing or gaining one electron when reacting

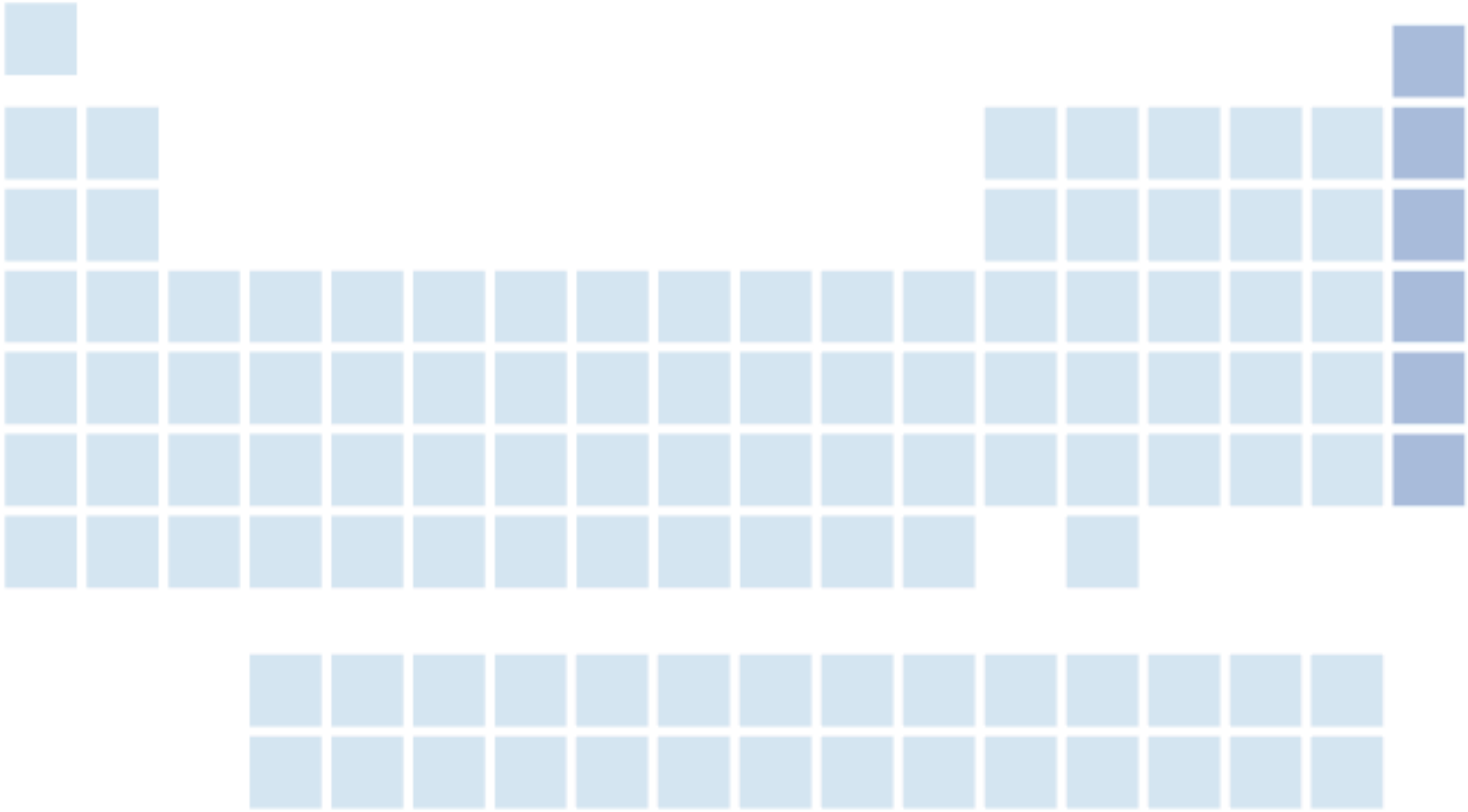


noble gases

18

2
He
Helium
10
Ne
Neon
18
Ar
Argon
36
Kr
Krypton
54
Xe
Xenon
86
Rn
Radon

- do not (ordinarily) form compounds
- do not gain, lose, or share electrons.



poor, poor Hydrogen…

- it really cannot be grouped into a family
- properties of hydrogen differ greatly from other elements
- so – why is it where it is on the PToE?