

## c6 ~ Chemical Periodicity

### Development of the PT:

~ mid-1800s -> had 70 known elements

*\*but no known relationship between the elements*

THEN: Dmitri Mendeleev

-> he arranged the elements into vertical columns by increasing Atomic Mass

-columns were next to each other based on similar chemical & physical properties

#16 36amu ? #18 40amu

*\*left blank spaces on his PT for unknown / yet-to-be discovered elements*

*\*he was able to predict the locations of several unknown elements*

THEN THEN ... in comes Henry Moseley with the modern PT

-> he arranged the elements in order of increasing Atomic Number

## the MODERN PERIODIC TABLE

- Periods: rows / Energy levels (horizontal)  
use numbers to identify each row (1-7)
- Groups/Families: ~~vertical~~ <sup>vertical</sup> columns (18 total)
  - ~~Group A~~ ~ Representative Elements
  - Group B ~ Transition Metals (*exceptions*)

*we will fix your PT on the next page*

### Periodic Law:

-when elements are arranged in order of increasing Atomic Number, there is a periodic pattern in the physical & chemical properties across the PT

IA <sup>1</sup>															VIIA <sup>3</sup>	Zero <sup>4</sup>	
H															H	He	
Li	IIA <sup>2</sup>																
Be																	
Na	Mg																
		IIIB	IVB	VB	VIB	VIIB	VIII			IB	IIB	IIIA	IVA	VA	VIA		
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	*Ac	Uaq	Unp	Umh												
		*Lanthanide series	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	
		*Actinide series	Th	Pu	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr	

not H  
p162-163

metal

nonmetal

touching staircase is metalloid

TRANSFORMS

halogens

\*Lanthanide series

\*Actinide series

<sup>1</sup>Group IA (excluding hydrogen) comprises the alkali metals.

<sup>3</sup>Group VIIA (excluding hydrogen) comprises the halogens.

<sup>2</sup>Group IIA comprises the alkaline-earth metals.

<sup>4</sup>Group zero comprises the noble gases.

## Periodic Trends

### Groupings

Noble Gases ~ Inert Gases (stable/unreactive) = VIII A

Alkali Metals I A (not H) → most reactive on PT

Alkaline Earth Metals II A → 2<sup>nd</sup> most reactive on PT

Halogens ~ salt-formers = VII A

Transition Metals Group B Elements

Lanthanides (Inner Transition Metals) ~ 4<sup>th</sup> row

Actinides (Inner Transition Metals) ~ 5<sup>th</sup> row } Rare Earth Elements  
(very radioactive)

### Trends

Atomic & Ionic Radii - distance of 1 nucleus to another nucleus when bonding

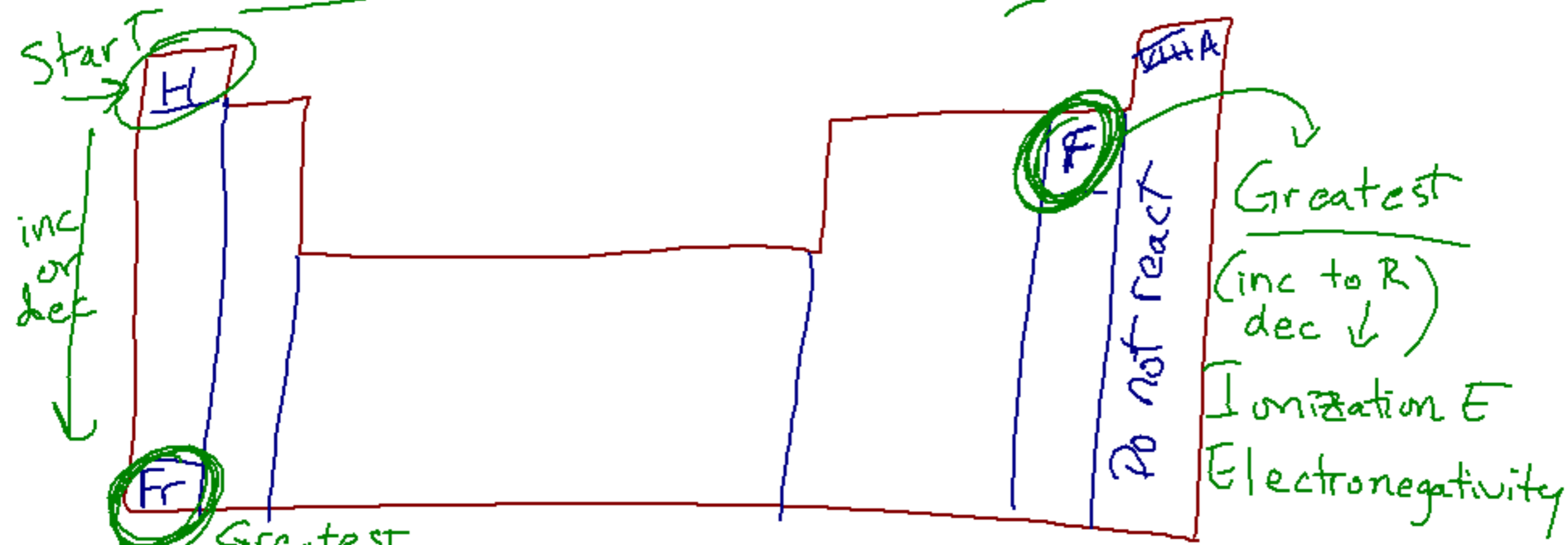
Group A Ionization Energies - amount of  $E$  it takes to remove  $1 e^-$

Group B Ionic Size - size of a charged atom → anions bigger than cations  
b/c having more  $e^-$

Electronegativity - amount of  $E$   
it takes to attract  $e^-$

# TRENDS

inc or dec



\* Do not consider VIII A when examining trends. b/c nonreactive.