

## Announcements – Lecture VIII– Thursday, Sep 25<sup>h</sup>

1. **Exam I – Tuesday, September 30<sup>th</sup> – In Class**
2. **Second Lab – Saturday, October 4<sup>th</sup> ... 1-4pm ... ISB 155/60 (A-E)**

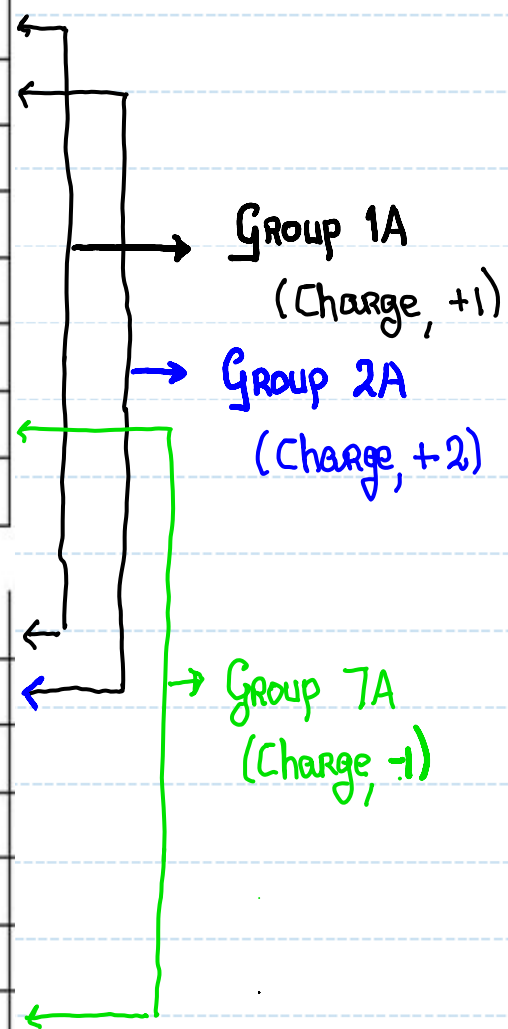
*a) Print lab prior to coming to lab -- use the 'Print Friendly Version' located on the top left hand side of the page – this is the version that contains the 'Data Sheet' that you will hand in upon completing the lab.*

*b) First set of Lab Owls will appear in Owl after this lab. There are a total of 4 sets of Lab Owls and they are worth 25% of the Lab Grade.*

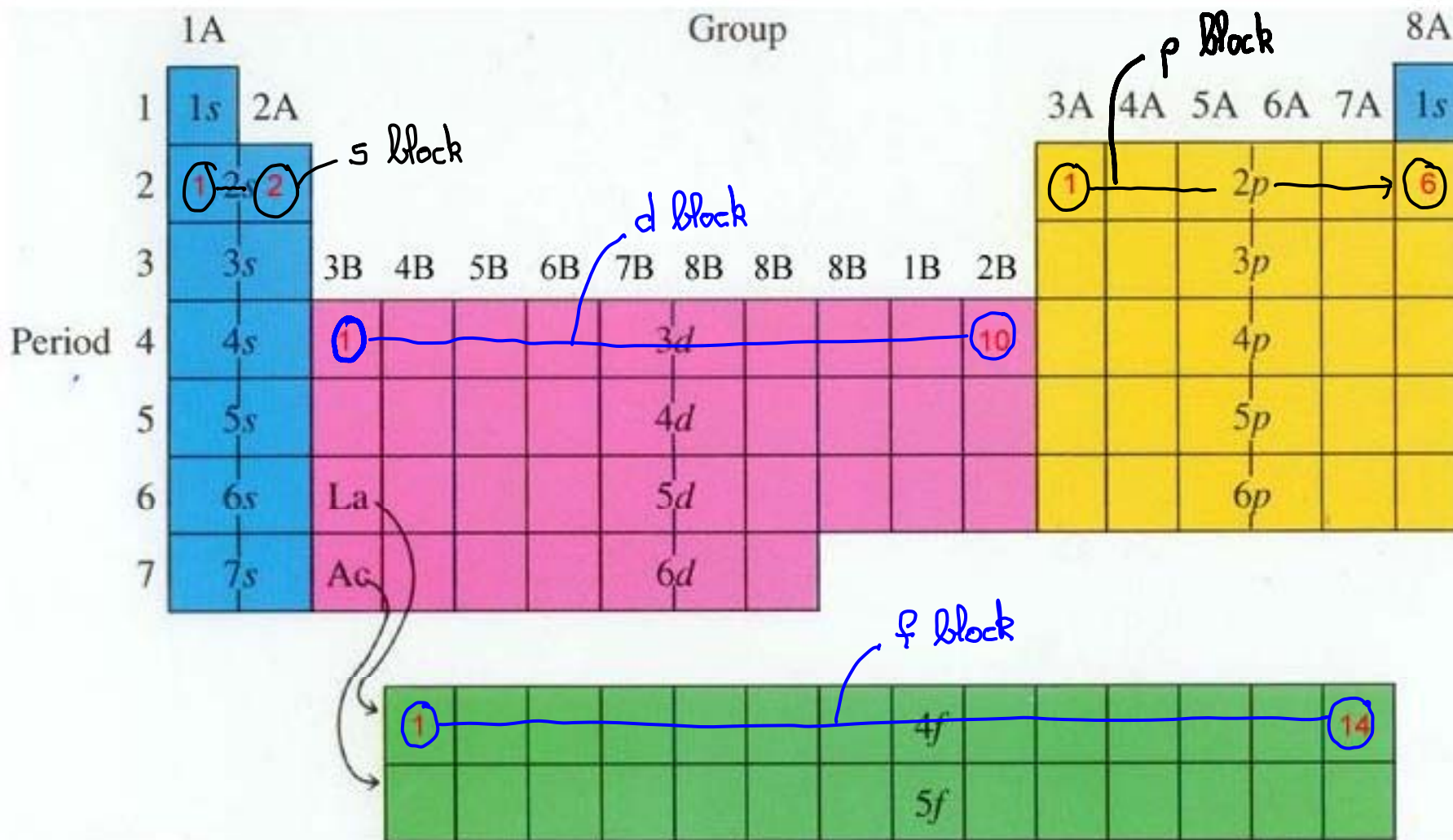


## 2.7 Electronic Configuration and Position in the Periodic Table

			Electron Configuration	Noble Gas	Valence
1A	Li	3	$1s^2 2s^1$	$[\text{He}] 2s^1$	1
2A	Be	4	$1s^2 2s^2$	$[\text{He}] 2s^2$	2
3A	B	5	$1s^2 2s^2 2p^1$	$[\text{He}] 2s^2 2p^1$	3
4A	C	6	$1s^2 2s^2 2p^2$	$[\text{He}] 2s^2 2p^2$	4
5A	N	7	$1s^2 2s^2 2p^3$	$[\text{He}] 2s^2 2p^3$	5
6A	O	8	$1s^2 2s^2 2p^4$	$[\text{He}] 2s^2 2p^4$	6
7A	F	9	$1s^2 2s^2 2p^5$	$[\text{He}] 2s^2 2p^5$	7
8A	Ne	10	$1s^2 2s^2 2p^6$	$[\text{He}] 2s^2 2p^6$	8
1A	Na	11	$1s^2 2s^2 2p^6 3s^1$	$[\text{Ne}] 3s^1$	1
2A	Mg	12	$1s^2 2s^2 2p^6 3s^2$	$[\text{Ne}] 3s^2$	2
3A	Al	13	$1s^2 2s^2 2p^6 3s^2 3p^1$	$[\text{Ne}] 3s^2 3p^1$	3
4A	Si	14	$1s^2 2s^2 2p^6 3s^2 3p^2$	$[\text{Ne}] 3s^2 3p^2$	4
5A	P	15	$1s^2 2s^2 2p^6 3s^2 3p^3$	$[\text{Ne}] 3s^2 3p^3$	5
6A	S	16	$1s^2 2s^2 2p^6 3s^2 3p^4$	$[\text{Ne}] 3s^2 3p^4$	6
7A	Cl	17	$1s^2 2s^2 2p^6 3s^2 3p^5$	$[\text{Ne}] 3s^2 3p^5$	7
8A	Ar	18	$1s^2 2s^2 2p^6 3s^2 3p^6$	$[\text{Ne}] 3s^2 3p^6$	8



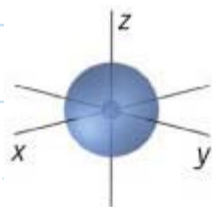
## 2.7 Electronic Configuration and Periodic Blocks



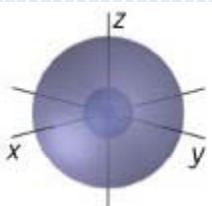
## 2.8 What Is a Periodic Property

### A Atomic Size

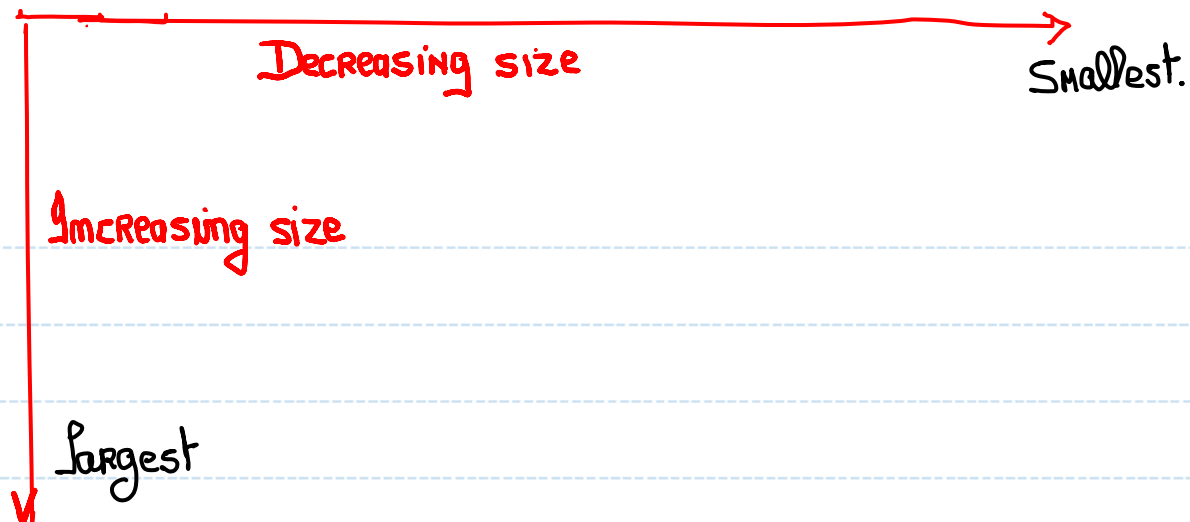
See link on class web site.



2	3 Li Lithium 6.941	4 Be Beryllium 9.0122	5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.0067	8 O Oxygen 15.9994	9 F Fluorine 18.9984	10 Ne Neon 20.1797
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3	11 Na Sodium 22.9898
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$\bullet \leftarrow d \rightarrow e^- \leftarrow$  Outermost electron

## 2.8 Periodic Properties

### A Atomic Size

Arrange the following elements in order of increasing size, by ranking them 1 (smallest) to 5 (largest).

1 O

5 Mg

2 C

3 Si

4 Al

							2 <b>He</b> Helium 4.0026
3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.0122	5 <b>B</b> Boron 10.811	6 <b>C</b> Carbon 12.011	7 <b>N</b> Nitrogen 14.0067	8 <b>O</b> Oxygen 15.9994	9 <b>F</b> Fluorine 18.9984	10 <b>Ne</b> Neon 20.1797
11 <b>Na</b> Sodium 22.9898	12 <b>Mg</b> Magnesium 24.3050	13 <b>Al</b> Aluminum 26.9815	14 <b>Si</b> Silicon 28.0855	15 <b>P</b> Phosphorus 30.9738	16 <b>S</b> Sulfur 32.066	17 <b>Cl</b> Chlorine 35.4527	18 <b>Ar</b> Argon 39.948
19 <b>K</b> Potassium 39.0983	20 <b>Ca</b> Calcium 40.078	31 <b>Ga</b> Gallium 69.723	32 <b>Ge</b> Germanium 72.61	33 <b>As</b> Arsenic 74.9216	34 <b>Se</b> Selenium 78.96	35 <b>Br</b> Bromine 79.904	36 <b>Kr</b> Krypton 83.80
37 <b>Rb</b> Rubidium 85.4678	38 <b>Sr</b> Strontium 87.62	49 <b>In</b> Indium 114.82	50 <b>Sn</b> Tin 118.710	51 <b>Sb</b> Antimony 121.757	52 <b>Te</b> Tellurium 127.60	53 <b>I</b> Iodine 126.9045	54 <b>Xe</b> Xenon 131.29

Smallest

Mg ✓

Al ✓

Which element did you rank as 2?

- a) O
- d) Si

- b) Mg
- e) Al

c) C

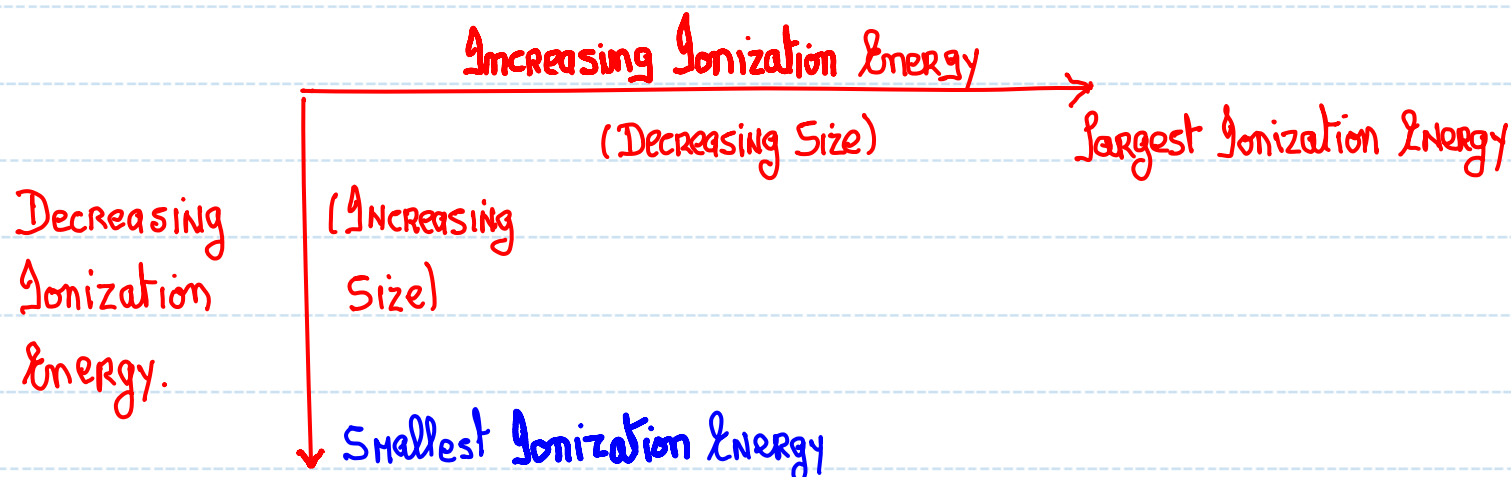


## 2.8 Periodic Properties

### B Ionization Energy

2	3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.0122	5 <b>B</b> Boron 10.811	6 <b>C</b> Carbon 12.011	7 <b>N</b> Nitrogen 14.0067	8 <b>O</b> Oxygen 15.9994	9 <b>F</b> Fluorine 18.9984	10 <b>Ne</b> Neon 20.1797
3	11 <b>Na</b> Sodium 22.9898	The amount of energy required to remove the outermost electron from an atom or ion.						

How easy is it to remove the outermost electron? ... Depends on how strongly it is held ... How is this related to size?



## 2.8 Periodic Properties

### B Ionization Energy

Arrange the following elements in order of increasing ionization energy, by ranking them 1 (smallest) to 4 (largest).

4 C

1 Ga

2 Al

3 Si

							2 <b>He</b> Helium 4.0026
3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.0122	5 <b>B</b> Boron 10.811	6 <b>C</b> Carbon 12.011	7 <b>N</b> Nitrogen 14.0067	8 <b>O</b> Oxygen 15.9994	9 <b>F</b> Fluorine 18.9984	10 <b>Ne</b> Neon 20.1797
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37 <b>Rb</b> Rubidium 85.4678	38 <b>Sr</b> Strontium 87.62	49 <b>In</b> Indium 114.82	50 <b>Sn</b> Tin 118.710	51 <b>Sb</b> Antimony 121.757	52 <b>Te</b> Tellurium 127.60	53 <b>I</b> Iodine 126.9045	54 <b>Xe</b> Xenon 131.29

largest IE

Ga ✓ (C)

Al ✓ (Si)

Which element did you rank as 3?

- a) C
- b) Ga
- c) Al
- d) Si



## 2.8 Periodic Properties

### C Electronegativity

2	3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.0122	5 <b>B</b> Boron 10.811	6 <b>C</b> Carbon 12.011	7 <b>N</b> Nitrogen 14.0067	8 <b>O</b> Oxygen 15.9994	9 <b>F</b> Fluorine 18.9984
3	11 <b>Na</b> Sodium 22.9898	A measure of the ability of an element to attract an electron.					

?



No vacancy

Where would an electron prefer to reside? ...

How is this related to size?

Increasing electronegativity

(Increasing attractiveness)

Most electronegative

Decreasing electronegativity

(Decreasing attractiveness)

Least electronegative





## 2.8 Periodic Properties

### C Electronegativity

a) Ca  
c) P

b) S  
d) As



Which of the above has the greatest electronegativity?

							2 <b>He</b> Helium 4.0026
3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.0122	5 <b>B</b> Boron 10.811	6 <b>C</b> Carbon 12.011	7 <b>N</b> Nitrogen 14.0067	8 <b>O</b> Oxygen 15.9994	9 <b>F</b> Fluorine 18.9984	10 <b>Ne</b> Neon 20.1797
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Ca √ (S)

