








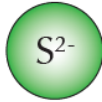




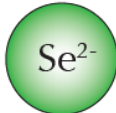




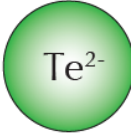
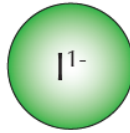





STUDENT REFERENCE SHEET

Ionic Radii

Periodic Trends


 = 1 Angstrom (Å) or 100 Picometers (pm)















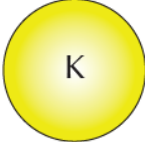
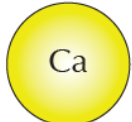





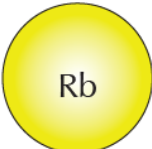
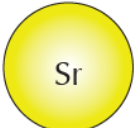





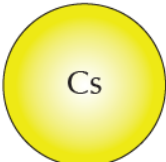
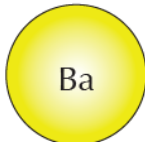
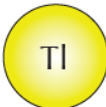
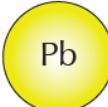

1A	2A	3A	4A	5A	6A	7A
Li ¹⁺  60pm	Be ²⁺  31pm		N ³⁻  171pm	O ²⁻  140pm	F ¹⁻  136pm	
Na ¹⁺  95pm	Mg ²⁺  65pm	Al ³⁺  50pm		S ²⁻  184pm	Cl ¹⁻  181pm	
K ¹⁺  133pm	Ca ²⁺  99pm	Ga ³⁺  62pm		Se ²⁻  198pm	Br ¹⁻  185pm	
Rb ¹⁺  148pm	Sr ²⁺  113pm	In ³⁺  81pm		Te ²⁻  221pm	I ¹⁻  216pm	
Cs ¹⁺  169pm	Ra ²⁺  135pm	Tl ³⁺  95pm				

STUDENT REFERENCE SHEET

Atomic Radii

Periodic Trends

 = 1 Angstrom (Å) or 100 Picometers (pm)

1A	2A	3A	4A	5A	6A	7A
 Li 157pm	 Be 111pm	 B 88pm	 C 77pm	 N 70pm	 O 66pm	 F 64pm
 Na 186pm	 Mg 160pm	 Al 143pm	 Si 117pm	 P 110pm	 S 104pm	 Cl 99pm
 K 231pm	 Ca 197pm	 Ga 122pm	 Ge 122pm	 As 121pm	 Se 117pm	 Br 114pm
 Rb 244pm	 Sr 215pm	 In 162pm	 Sn 140pm	 Sb 141pm	 Te 137pm	 I 133pm
 Cs 262pm	 Ba 217pm	 Tl 171pm	 Pb 175pm	 Bi 146pm		

STUDENT REFERENCE SHEET

Electronegativities

Periodic Trends

	1A																			8A	
1	H 2.1	2A																			
2	Li 1.0	Be 1.5																			
3	Na 0.9	Mg 1.2																			
			3B	4B	5B	6B	7B	← 8B →	1B	2B											
4	K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.8	Ni 1.8	Cu 1.9	Zn 1.7	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8				
5	Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5				
6	Cs 0.7	Ba 0.9	La* 1.1	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Tl 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2				
7	Fr 0.7	Ra 0.9	Ac ^y 1.1																		

*Lanthanide series 1.1-1.3
^yActinide series 1.3-1.5

1st Ionization Energies

	Group 1																				18
1	H 1312	2																			He 2372
2	Li 520	Be 900																			
3	Na 496	Mg 738																			
			3	4	5	6	7	8	9	10	11	12									
4	K 419	Ca 590	Sc 633	Ti 659	V 651	Cr 653	Mn 717	Fe 762	Co 760	Ni 737	Cu 746	Zn 906	Ga 579	Ge 762	As 947	Se 941	Br 1140	Kr 1351			
5	Rb 403	Sr 550	Y 600	Zr 640	Nb 652	Mo 684	Tc 702	Ru 710	Rh 720	Pd 804	Ag 731	Cd 868	In 558	Sn 709	Sb 834	Te 869	I 1008	Xe 1170			
6	Cs 376	Ba 503	La* 538	Hf 659	Ta 761	W 770	Re 760	Os 839	Ir 878	Pt 868	Au 890	Hg 1007	Tl 589	Pb 716	Bi 803	Po 812	At --	Rn 1038			
7	Fr --	Ra 509	Ac ^y 490	Rf --	Db --	Sg --	Bh --	Hs --	Mt --	Ds --	Uuu --	Uub --	Uut --	Uuq --	Uup --						

Mg — Symbol
738 — First Ionization Energy (kJ/mol)

*Lanthanide series

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
534	527	533	536	545	547	592	566	573	581	589	597	603	523
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
587	570	598	600	585	578	581	601	608	619	627	635	642	--

^yActinide series

STUDENT REFERENCE SHEET

Elements Summary Table

Periodic Trends

Element and Atomic #	Atomic Radii (pm)	Ionic Radii (pm)	1 st Ionization Energy (kJ/mol)	Electronegativity (Pauling)
Li (3)	152	60	520	1.0
Be (4)	111	31	899	1.5
N (7)	70	171	1402	3.0
O (8)	66	140	1314	3.5
F (9)	64	136	1681	4.0
Na (11)	186	95	496	0.9
Mg (12)	160	65	738	1.2
Al (13)	143	50	578	1.5
S (16)	104	184	999	2.5
Cl (17)	99	181	1256	3.0
K (19)	231	133	419	0.8
Ca (20)	197	99	590	1.0
Ga (31)	122	62	579	1.6
Se (34)	117	198	941	2.4
Br (35)	114	185	1140	2.8
Rb (37)	244	148	403	0.8
Sr (38)	215	113	549	1.0
In (49)	162	81	558	1.7
Te (52)	137	221	869	2.1
I (53)	133	216	1008	2.5