NAME:_____KEY_____ **SECTION:_____**

Electron Configurations

Write the complete (expanded) electron configurations and core (noble gas) electron configurations for the following elements. Use only this periodic table for reference.

Group 1(1A) – Alkali Metals

Element	Expanded Electron Configuration	Core Notation
H	$1s^1$	Not for this one
Li	$1s^2 2s^1$	[He]$2s^1$
Na	$1s^2 2s^2 2p^6 3s^1$	[Ne]$3s^1$
K	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$	[Ar]$4s^1$
Rb	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1$	[Kr]$5s^1$
Cs	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^1$	[Xe]$6s^1$
Fr	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6 7s^1$	[Rn]$7s^1$

NAME:_____Key_____ **SECTION:_____**

Group 2(2A) – Alkaline Earth Metals

Element	Expanded Electron Configuration	Core Notation
Be	$1s^2 2s^2$	$[He]2s^2$
Mg	$1s^2 2s^2 2p^6 3s^2$	$[Ne]3s^2$
Ca	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$	$[Ar]4s^2$
Sr	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2$	$[Kr]5s^2$
Ba	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2$	$[Xe]6s^2$
Ra	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6 7s^2$	$[Rn]7s^2$

Group 13(3A)

Element	Expanded Electron Configuration	Core Notation
B	$1s^2 2s^2 2p^1$	$[He]2s^2 2p^1$
Al	$1s^2 2s^2 2p^6 3s^2 3p^1$	$[Ne]3s^2 3p^1$
Ga	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^1$	$[Ar]4s^2 3d^{10} 4p^1$
In	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^1$	$[Kr]5s^2 4d^{10} 5p^1$
Tl	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^1$	$[Xe]6s^2 4f^{14} 5d^{10} 6p^1$

NAME:_____Key_____ **SECTION:_____**

Group 14(4A)

Element	Expanded Electron Configuration	Core Notation
C	$1s^2 2s^2 2p^2$	$[He] 2s^2 2p^2$
Si	$1s^2 2s^2 2p^6 3s^2 3p^2$	$[Ne] 3s^2 3p^2$
Ge	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^2$	$[Ar] 4s^2 3d^{10} 4p^2$
Sn	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^2$	$[Kr] 5s^2 4d^{10} 5p^2$
Pb	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^2$	$[Xe] 6s^2 4f^{14} 5d^{10} 6p^2$

Group 15 (5A)

Element	Expanded Electron Configuration	Core Notation
N	$1s^2 2s^2 2p^3$	$[He] 2s^2 2p^3$
P	$1s^2 2s^2 2p^6 3s^2 3p^3$	$[Ne] 3s^2 3p^3$
As	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^3$	$[Ar] 4s^2 3d^{10} 4p^3$
Sb	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^3$	$[Kr] 5s^2 4d^{10} 5p^3$
Bi	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^3$	$[Xe] 6s^2 4f^{14} 5d^{10} 6p^3$

NAME:_____Key_____ **SECTION:_____**

Group 16 (6A)

Element	Expanded Electron Configuration	Core Notation
O	$1s^2 2s^2 2p^4$	$[He] 2s^2 2p^4$
S	$1s^2 2s^2 2p^6 3s^2 3p^4$	$[Ne] 3s^2 3p^4$
Se	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$	$[Ar] 4s^2 3d^{10} 4p^4$
Te	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^4$	$[Kr] 5s^2 4d^{10} 5p^4$
Po	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^4$	$[Xe] 6s^2 4f^{14} 5d^{10} 6p^4$

Group 17(7A) - Halogens

Element	Expanded Electron Configuration	Core Notation
F	$1s^2 2s^2 2p^5$	$[He] 2s^2 2p^5$
Cl	$1s^2 2s^2 2p^6 3s^2 3p^5$	$[Ne] 3s^2 3p^5$
Br	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$	$[Ar] 4s^2 3d^{10} 4p^5$
I	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^5$	$[Kr] 5s^2 4d^{10} 5p^5$
At	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^5$	$[Xe] 6s^2 4f^{14} 5d^{10} 6p^5$

NAME:_____Key_____ **SECTION:_____**

Group 18(8A) — Noble Gases

Element	Expanded Electron Configuration	Core Notation
He	$1s^2$	Not for this one
Ne	$1s^2 2s^2 2p^6$	$[He] 2s^2 2p^6$
Ar	$1s^2 2s^2 2p^6 3s^2 3p^6$	$[Ne] 3s^2 3p^6$
Kr	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$	$[Ar] 4s^2 3d^{10} 4p^6$
Xe	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6$	$[Kr] 5s^2 4d^{10} 5p^6$
Rn	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6$	$[Xe] 6s^2 4f^{14} 5d^{10} 6p^6$

NAME:_____Key_____ **SECTION:_____**

Period 4 Transition Elements

Element	Expanded Electron Configuration	Core Notation
Sc	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$	$[Ar] 4s^2 3d^1$
Ti	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^2$	$[Ar] 4s^2 3d^2$
V	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$	$[Ar] 4s^2 3d^3$
Cr	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$	$[Ar] 4s^1 3d^5$
Mn	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$	$[Ar] 4s^2 3d^5$
Fe	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$	$[Ar] 4s^2 3d^6$
Co	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$	$[Ar] 4s^2 3d^7$
Ni	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$	$[Ar] 4s^2 3d^8$
Cu	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$	$[Ar] 4s^1 3d^{10}$
Zn	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$	$[Ar] 4s^2 3d^{10}$

NAME:_____Key_____ **SECTION:_____**

Period 5 Transition Elements

Element	Expanded Electron Configuration	Core Notation
Y	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^1$	$[Kr] 5s^2 4d^1$
Zr	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^2$	$[Kr] 5s^2 4d^2$
Nb*	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1 4d^4$	$[Kr] 5s^1 4d^4$
Nb#	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^3$	$[Kr] 5s^2 4d^3$
Mo*	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1 4d^5$	$[Kr] 5s^1 4d^5$
Mo#	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^4$	$[Kr] 5s^2 4d^4$
Tc*	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1 4d^6$	$[Kr] 5s^1 4d^6$
Tc#	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^5$	$[Kr] 5s^2 4d^5$
Ru*	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1 4d^7$	$[Kr] 5s^1 4d^7$
Ru#	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^6$	$[Kr] 5s^2 4d^6$
Rh*	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1 4d^8$	$[Kr] 5s^1 4d^8$
Rh#	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^7$	$[Kr] 5s^2 4d^7$
Pd*	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 4d^{10}$	$[Kr] 4d^{10}$
Pd#	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^8$	$[Kr] 5s^2 4d^8$
Ag*	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1 4d^{10}$	$[Kr] 5s^1 4d^{10}$
Ag#	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^9$	$[Kr] 5s^2 4d^9$
Cd	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10}$	$[Kr] 5s^2 4d^{10}$

*** These are exceptions which you do not need to memorize.**

 # Use these instead

NAME:_____Key_____ **SECTION:_____**

+1 Cations

Remember, when forming cations always take electrons out of the highest occupied "n" orbital first!

Element	Expanded Electron Configuration	Core Notation
Li^+	$1s^2$	Not for this one
Na^+	$1s^2 2s^2 2p^6$	$[He]2s^2 2p^6$
K^+	$1s^2 2s^2 2p^6 3s^2 3p^6$	$[Ne]3s^2 3p^6$
Rb^+	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$	$[Ar]4s^2 3d^{10} 4p^6$
Cs^+	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6$	$[Kr]5s^2 4d^{10} 5p^6$
Fr^+	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6$	$[Xe]6s^2 4f^{14} 5d^{10} 6p^6$
Ga^+	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$	$[Ar]4s^2 3d^{10}$
Cu^+	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$	$[Ar]3d^{10}$
Ag^+*	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 4d^{10}$	$[Kr]4d^{10}$
Ag^+#	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1 4d^9$	$[Kr]5s^1 4d^9$
Tl^+	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10}$	$[Xe]6s^2 4f^{14} 5d^{10}$

*** This is an exception which you do not need to memorize.**

 # Use this instead

NAME:_____Key_____ **SECTION:_____**

+2 Cations

Remember, when forming cations always take electrons out of the highest occupied "n" orbital first!

Element	Expanded Electron Configuration	Core Notation
Be^{2+}	$1s^2$	Not for this one
Mg^{2+}	$1s^2 2s^2 2p^6$	$[He]2s^2 2p^6$
Ca^{2+}	$1s^2 2s^2 2p^6 3s^2 3p^6$	$[Ne]3s^2 3p^6$
Sr^{2+}	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$	$[Ar]4s^2 3d^{10} 4p^6$
Ba^{2+}	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6$	$[Kr]5s^2 4d^{10} 5p^6$
Ra^{2+}	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6$	$[Xe]6s^2 4f^{14} 5d^{10} 6p^6$
Fe^{2+}	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^6$	$[Ar]3d^6$
Cu^{2+}	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$	$[Ar]3d^9$
Zn^{2+}	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$	$[Ar]3d^{10}$
Cd^{2+}	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 4d^{10}$	$[Kr]4d^{10}$

NAME:_____Key_____ **SECTION:_____**

+3 Cations

Remember, when forming cations always take electrons out of the highest occupied "n" orbital first!

Element	Expanded Electron Configuration	Core Notation
B^{3+}	$1s^2$	Not for this one
Al^{3+}	$1s^2 2s^2 2p^6$	$[He]2s^2 2p^6$
Ga^{3+}	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$	$[Ar]3d^{10}$
Sc^{3+}	$1s^2 2s^2 2p^6 3s^2 3p^6$	$[Ne]3s^2 3p^6$
Cr^{3+}	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^3$	$[Ar]3d^3$
Fe^{3+}	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$	$[Ar]3d^5$

NAME:_____Key_____ **SECTION:_____**

-1 Anions

Element	Expanded Electron Configuration	Core Notation
H^-	$1s^2$	[He]
F^-	$1s^2 2s^2 2p^6$	[He]$2s^2 2p^6$
Cl^-	$1s^2 2s^2 2p^6 3s^2 3p^6$	[Ne]$3s^2 3p^6$
Br^-	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$	[Ar]$4s^2 3d^{10} 4p^6$
I^-	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6$	[Kr]$5s^2 4d^{10} 5p^6$
At^-	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6$	[Xe]$6s^2 4f^{14} 5d^{10} 6p^6$

-2 Anions

Element	Expanded Electron Configuration	Core Notation
O^{2-}	$1s^2 2s^2 2p^6$	[He]$2s^2 2p^6$
S^{2-}	$1s^2 2s^2 2p^6 3s^2 3p^6$	[Ne]$3s^2 3p^6$
Se^{2-}	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$	[Ar]$4s^2 3d^{10} 4p^6$
Te^{2-}	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6$	[Kr]$5s^2 4d^{10} 5p^6$
Po^{2-}	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6$	[Xe]$6s^2 4f^{14} 5d^{10} 6p^6$

NAME:_____Key_____ **SECTION:_____**

-3 Anions

Element	Expanded Electron Configuration	Core Notation
N^{3-}	$1s^2 2s^2 2p^6$	$[He] 2s^2 2p^6$
P^{3-}	$1s^2 2s^2 2p^6 3s^2 3p^6$	$[Ne] 3s^2 3p^6$
As^{3-}	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$	$[Ar] 4s^2 3d^{10} 4p^6$