



Pakistan School
Kingdom of Bahrain

Grade :9th

Subject: Chemistry

**Welcome to
E-Learning**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



رَبِّ زِدْنِي عِلْمًا

Rabbi zidnī 'ilmā

O my Lord! Advance me in Knowledge

[Qur'an, 20:114]

CHEMISTRY

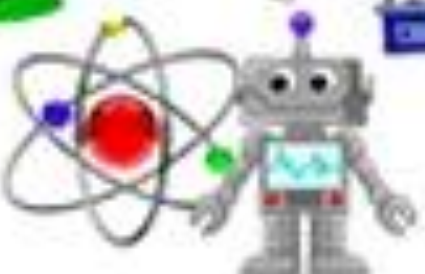
you



research



technology



science



industry



medicine



environment



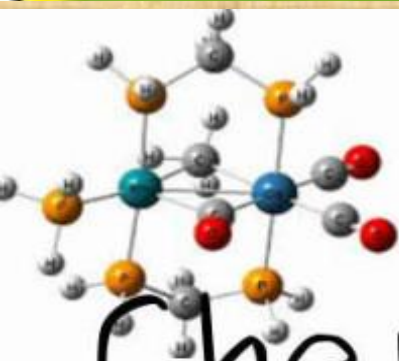
health



community



Welcome!



Chemistry



Periodic Table of the Elements

Periodic Table of the Elements

1 H 1.01																	2 He 4.00				
3 Li 6.94	4 Be 9.01															5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.30															13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80				
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (97.91)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.75	52 Te 127.60	53 I 126.90	54 Xe 131.29				
55 Cs 132.91	56 Ba 137.33	57 La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.85	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209.98)	85 At (209.99)	86 Rn (222.02)				
87 Fr (223.02)	88 Ra (226.03)	89 Ac (227.03)	104 Rf (261.11)	105 Ha (262.11)	106 Sg (263.12)																

58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (144.91)	62 Sm 150.36	63 Eu 151.97	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97
90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237.05)	94 Pu (244.06)	95 Am (243.06)	96 Cm (247.07)	97 Bk (247.07)	98 Cf (251.08)	99 Es (252.08)	100 Fm (257.10)	101 Md (258.10)	102 No (259.10)	103 Lr (262.11)

Virtual Classroom Rules



Select a quiet place to study.



Be on time.



Come to class prepared in every way to learn and participate.

Virtual Classroom Rules



Be respectful.



Listen to & follow directions.

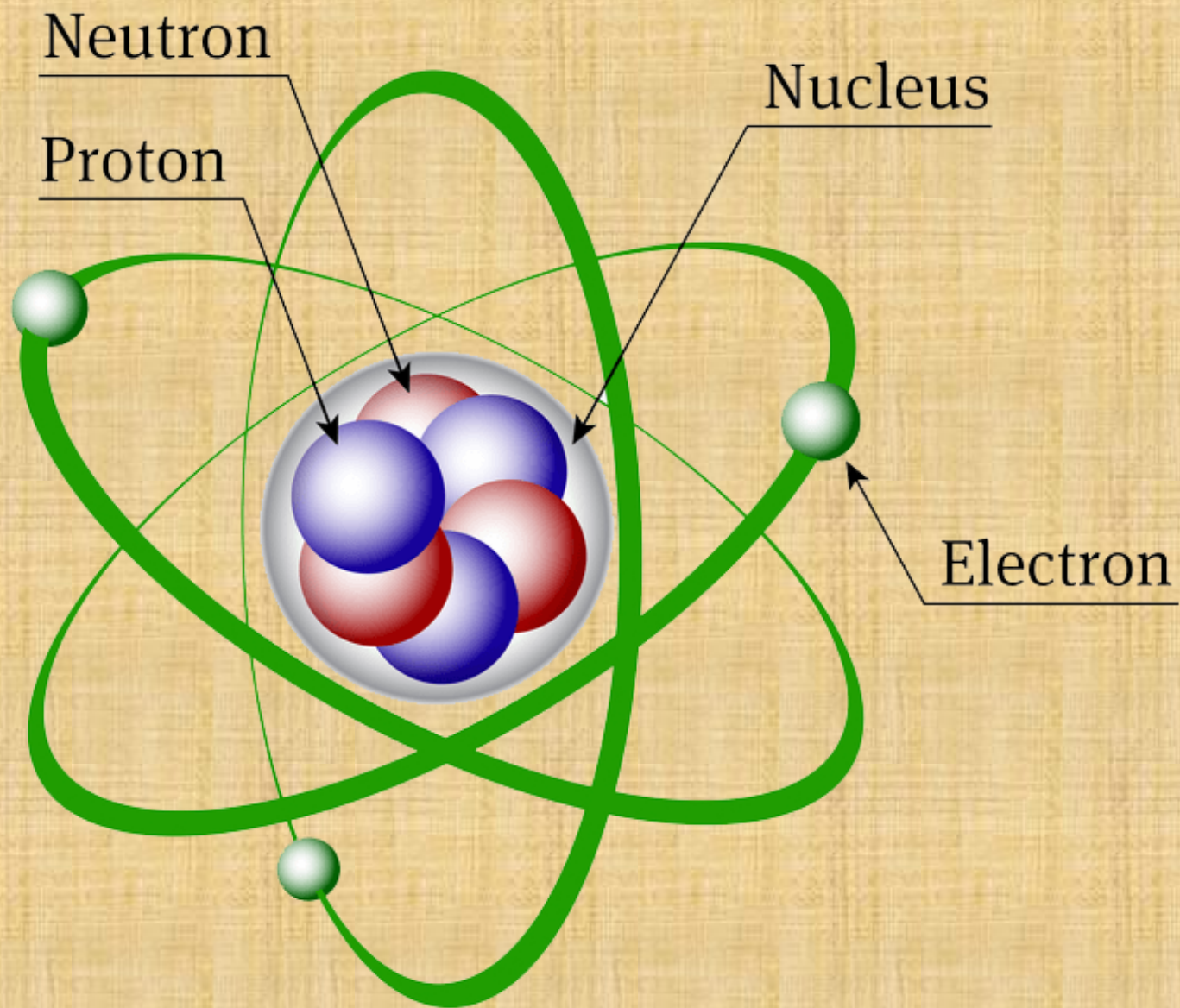


Turn off your video before joining the class.

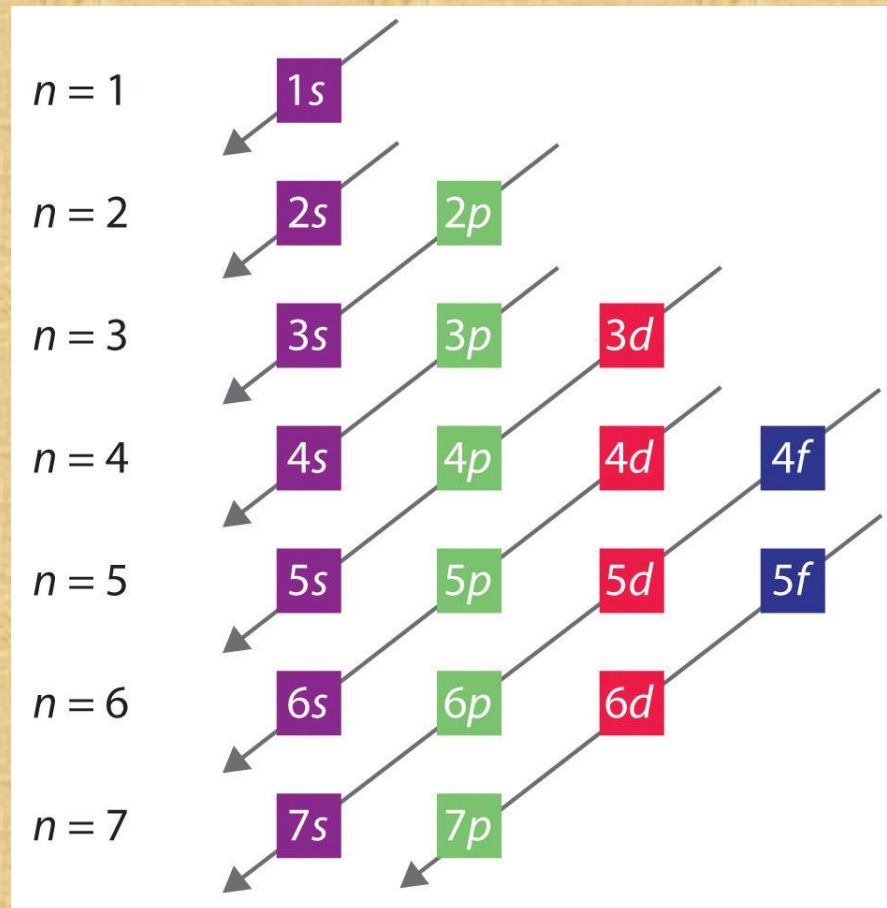


I hope you will follow all the above mentioned rules to make your dear teacher happy.

- **ENGAGING STARTER**



Electronic Configuration



Lesson Objectives:

- By the end of this part of lesson, students will be able to:
 - Write the electronic configuration of the first 18 elements in the Periodic Table.
 - Generate the electronic configuration for the atom of any element using orbital notation.

First Twenty Elements

1 H Hydrogen	2 He Helium	3 Li Lithium	4 Be Beryllium	5 B Boron
6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium	13 Al Aluminum	14 Si Silicon	15 P Phosphorus
16 S Sulfur	17 Cl Chlorine	18 Ar Argon	19 K Potassium	20 Ca Calcium

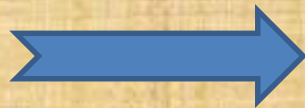
Element nameAtomic numberAtomic mass			Element nameAtomic numberAtomic mass		
Hydrogen	1	1	Sodium	11	23
Helium	2	4	Magnesium	12	24
Lithium	3	7	Aluminium	13	27
Beryllium	4	9	Silicon	14	28
Boron	5	11	Phosphorus	15	31
Carbon	6	12	Sulphur	16	32
Nitrogen	7	14	Chlorine	17	35.5
Oxygen	8	16	Argon	18	40
Fluorine	9	19	Potassium	19	39
Neon	10	20	Calcium	20	40

Electronic Configuration

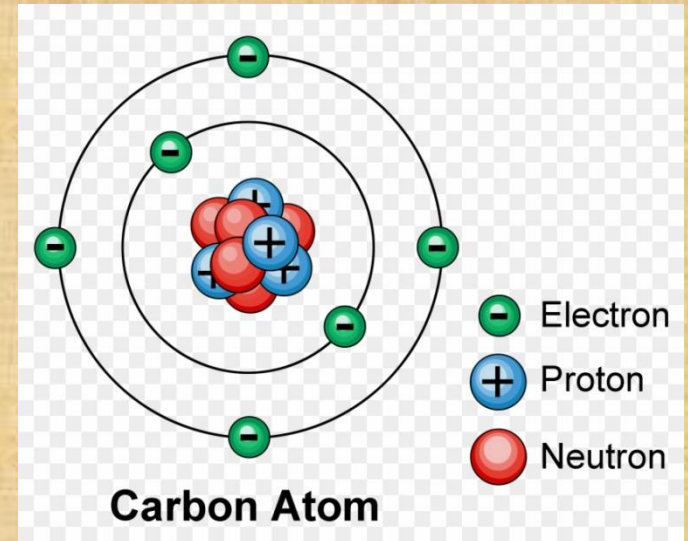
- Shells
- Sub-shells
- Atomic Number

ATOMIC STRUCTURE

- ☐ Electron
- ☐ Proton
- ☐ Neutron



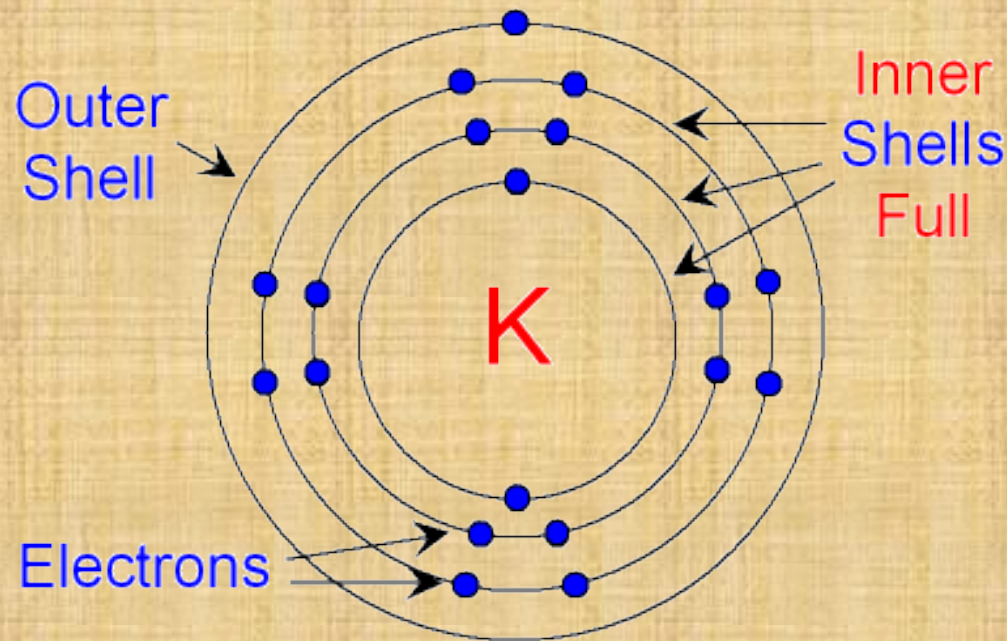
Sub Atomic Particles



ORBIT/SHELL/ENERGY LEVEL

Shell/Orbit/Energy level:

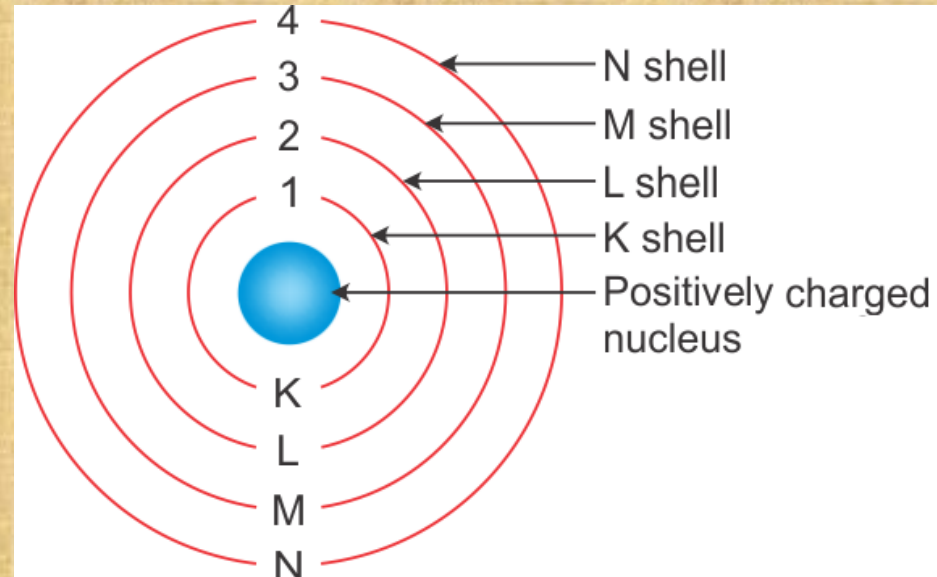
- ❖ An orbit is a well defined circular path in which electrons revolve around the nucleus of an atom.



Each shell has a fixed energy ,so each shell is also called energy level.Each shell is described by an “n” value. n can have values 1,2,3.....

- When,

- n= 1,it is **K** shell
- n =2,it is **L** shell
- n= 3,it is **M** shell
- n= 4,it is **N** shell



❖As the value of “n” increases the distance of electron from the nucleus and energy of the shell increases.

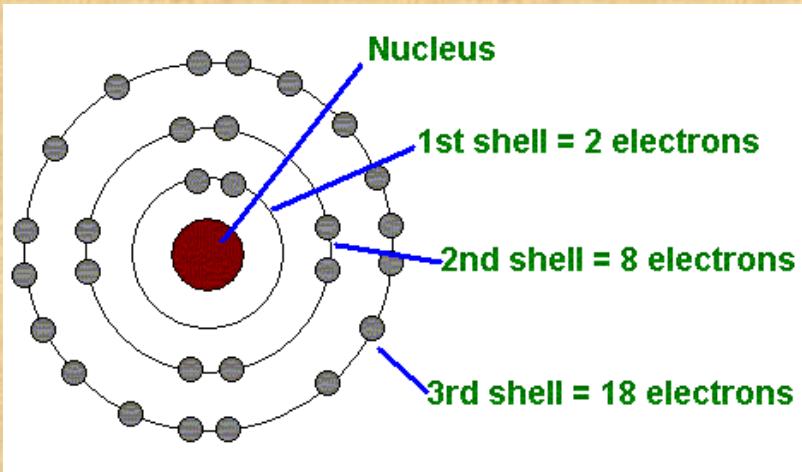
$K < L < M < N \dots\dots\dots$

← less energy

• Accommodation of electrons in each shell

- K-Shell (Maximum 2-electrons)
- L-Shell (Maximum 8-electrons)
- M-Shell (Maximum 18-electrons)
- N-Shell (Maximum 32-electrons)

and So on ...



❖ Maximum number of electron calculation formula:

Maximum number of electrons in a shell= $2n^2$

$2n^2$

{Where $n=1,2,3,4,.....$ }

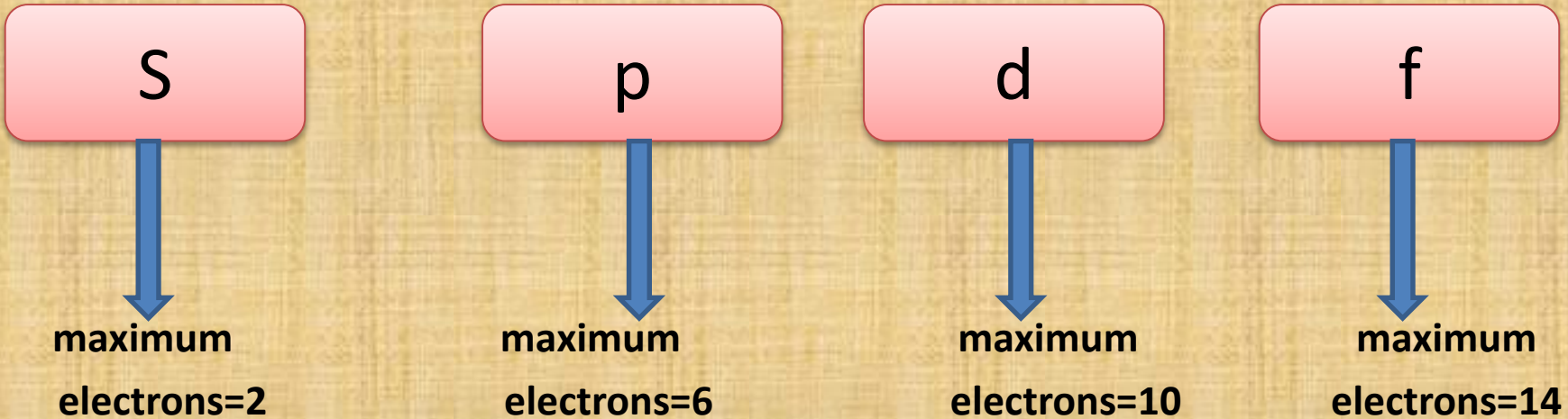
- $2(1)^2 = 2 \times 1 = 2$
- $2(2)^2 = 2 \times 4 = 8$
- $2(3)^2 = 2 \times 9 = 18$
- $2(4)^2 = 2 \times 16 = 32$

- For
- K-shell ($n=1$)
 - L-shell ($n=2$)
 - M-shell ($n=3$)
 - N-shell ($n=4$)

- Sub-Shells/Sub-orbits/Sub-energy level

A sub-orbit is a sub division of electron shells(orbit) separated by electron orbitals.
Sub orbit also known as sub shells or sub energy level..

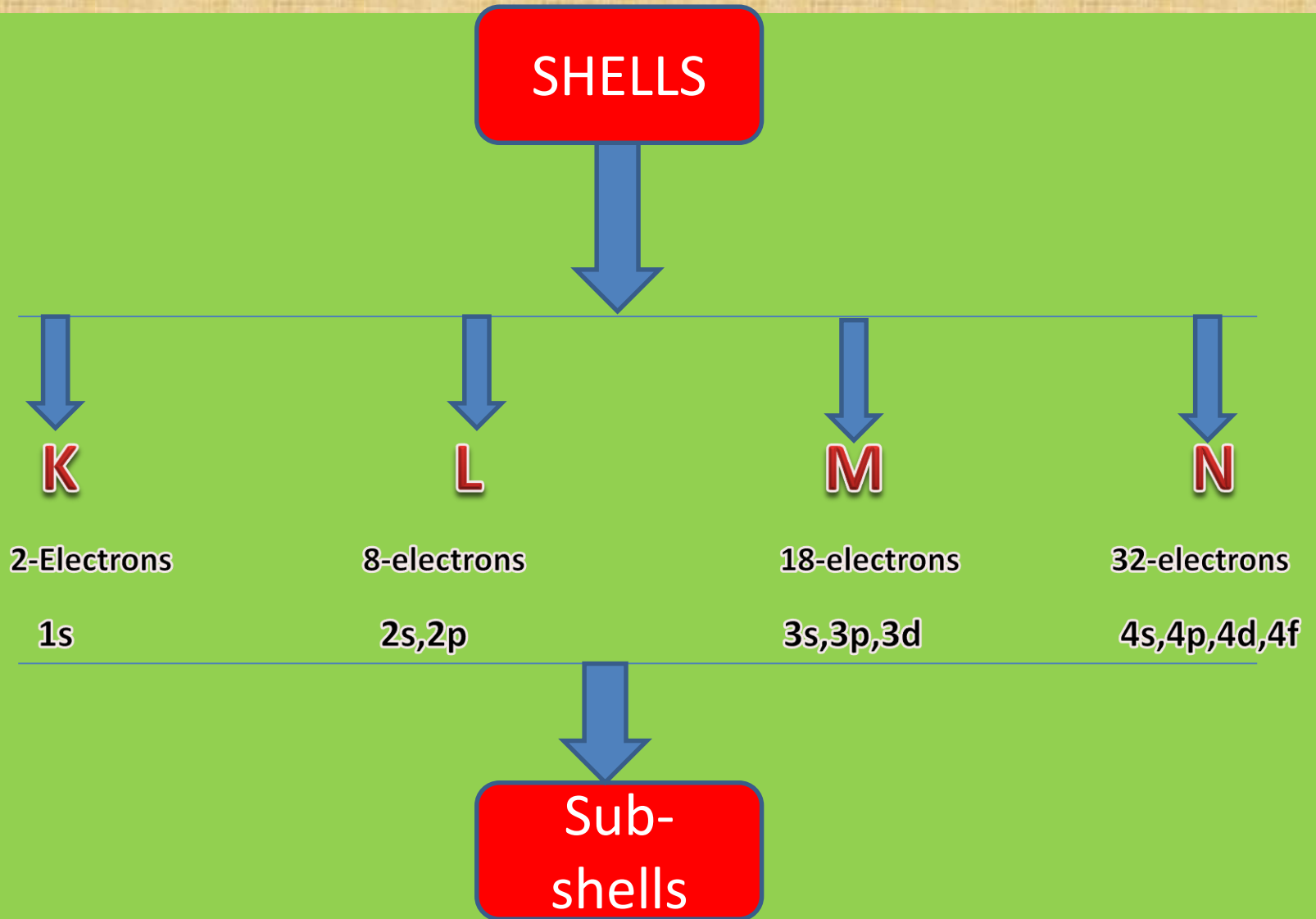
Sub shells are denoted by:



How many sub-shells
will be present in each
Shell?

- K (n=1) → s
- L (n=2) → s,p
- M (n=3) → s,p,d
- N (n=4) → s,p,d,f

Shells and Sub-Shells



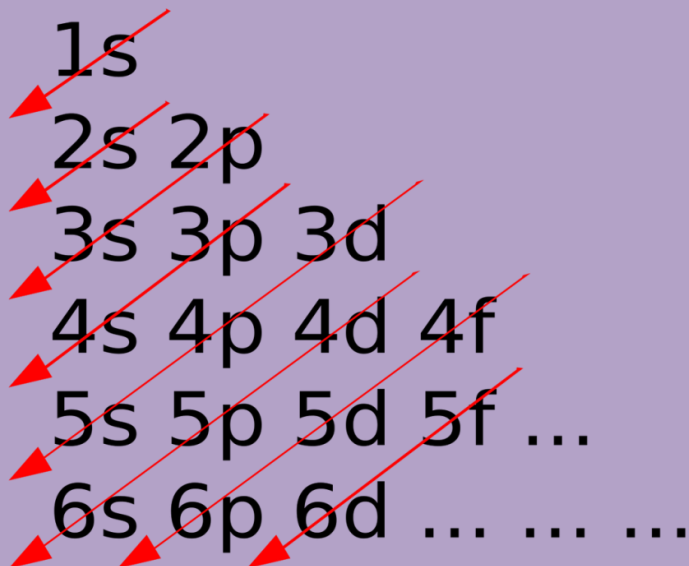
Electronic Configuration

- Definition:

The arrangement of electrons in sub-shells is called the Electronic configuration. Electrons can filled in various elements by using "Auf Bau" Principle.

Auf Bau Principle:

According to this principle ,electrons fill the lowest energy sub-shell that is available first. or electrons are added in orbitals in order of increasing energy values. This means electron will fill first 1s,then 2s, then 2p and so on....



Electronic Configuration Tricks

1

s

2-Electrons

2

p

6-Electrons

3

d

10-Electrons

4

f

14-Electrons

S,p,d,f



s	s						
p	s	p	s				
d	p	s	d	p	s		
f	d	p	s	f	d	p	s

Electronic Configuration Tricks

1

s

2-Electrons

2

p

6-Electrons

3

d

10-Electrons

4

f

14-Electrons

1s	2s						
2p	3s	3p	4s				
3d	4p	5s	4d	5p	6s		
4f	5d	6p	7s	5f	6d	7p	8s

Electronic Configuration:

1s,2s,2p,3s,3p,4s,3d,4p,5s,4d,
5p,6s,4f,5d,6p,7s,5f,6d,7p,8s

.....so on

Examples:

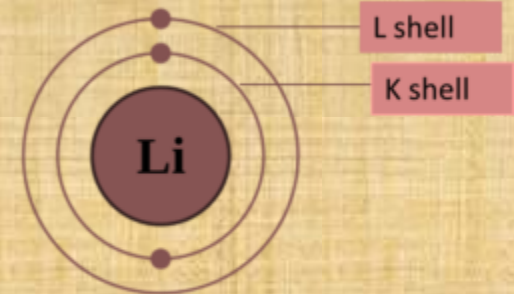
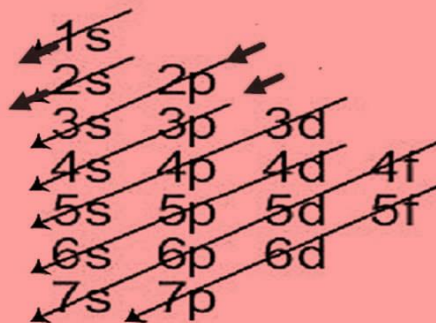
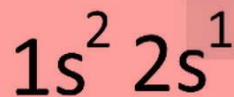
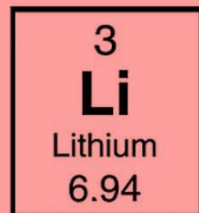
- Electronic configuration of Lithium:

Electron Configuration Chart

s holds up to 2

p holds up to 6

d holds up to 10



Lithium
(3 electrons = 1st and 2nd orbit)

Electronic configuration of Carbon:

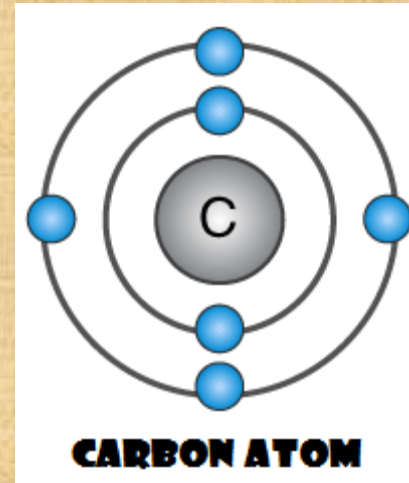
Electron Configuration Chart

s holds up to 2

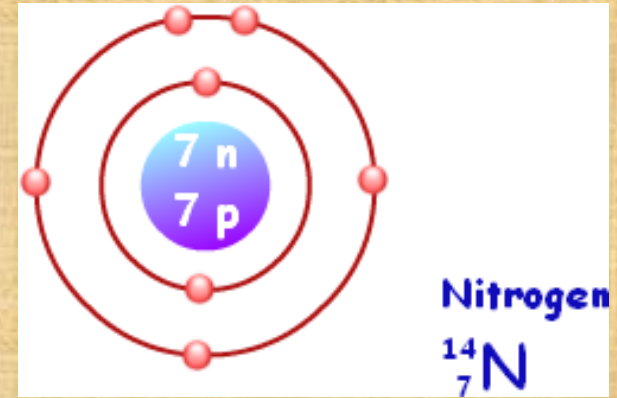
p holds up to 6

d holds up to 10

6
C
Carbon
12.01



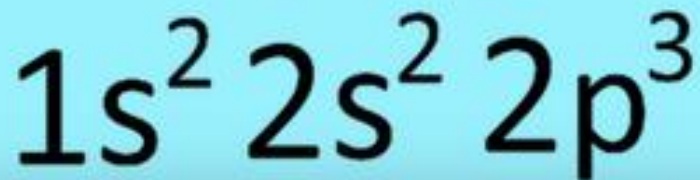
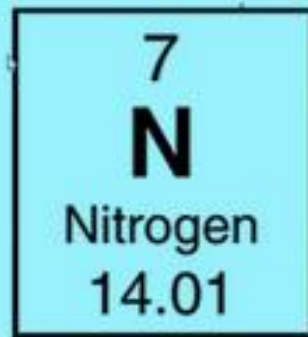
- Electronic configuration of Nitrogen:



s holds up to 2

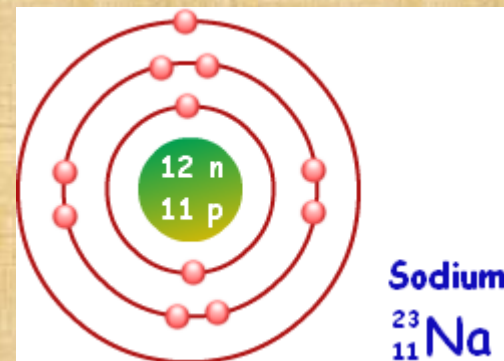
p holds up to 6

d holds up to 10



More electron config.

❖ Electronic configuration of Sodium

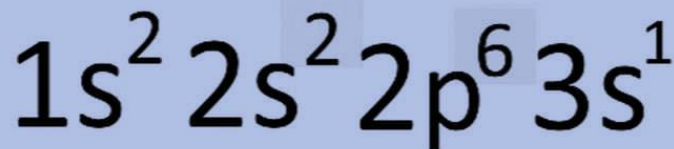
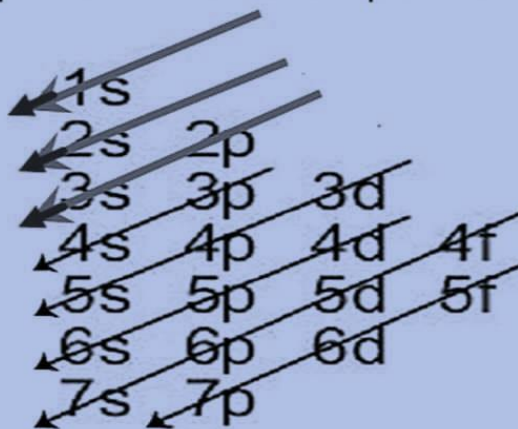
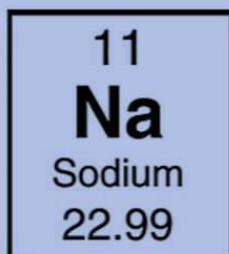


● Electron Configuration Chart

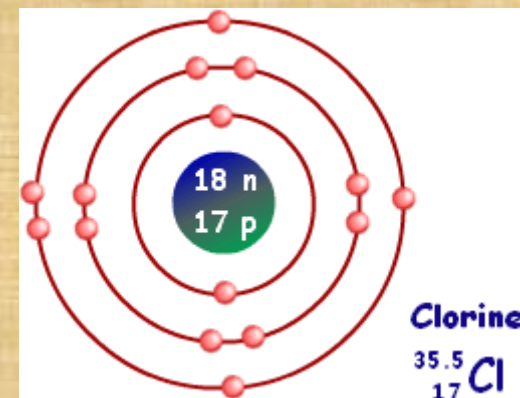
s holds up to 2

p holds up to 6

d holds up to 10



❖ Electronic configuration of Chlorine

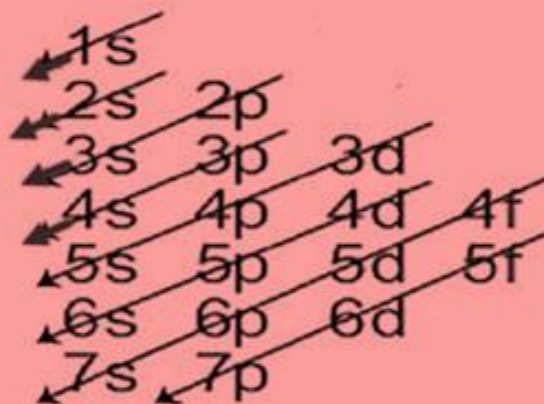
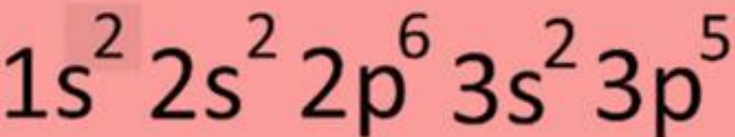
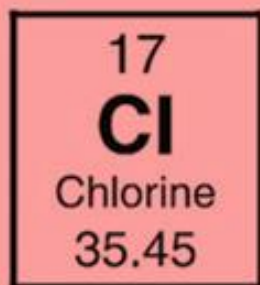


Electron Configuration Chart

s holds up to 2

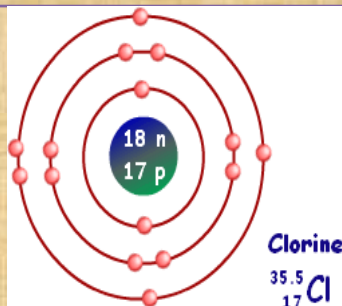
p holds up to 6

d holds up to 10

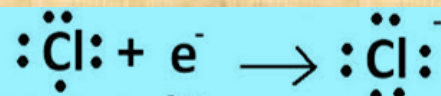
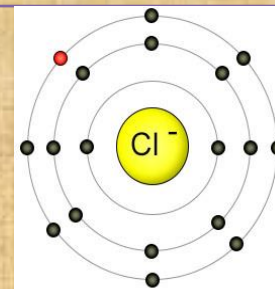


Q: What will be the difference between Electronic Configuration of Cl and Cl⁻ ?

Chlorine atom Cl



Chloride ion Cl⁻

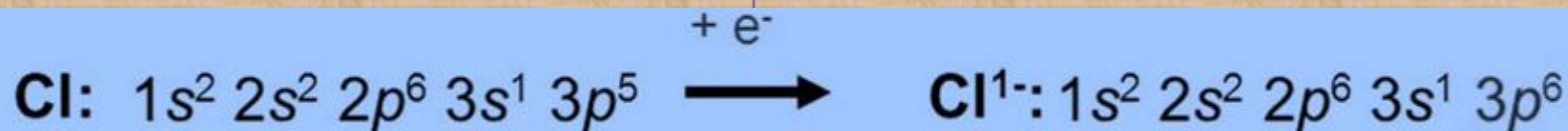
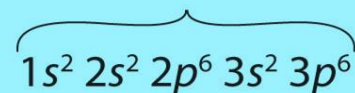
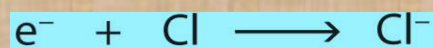
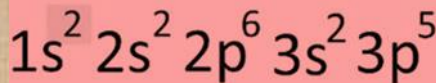
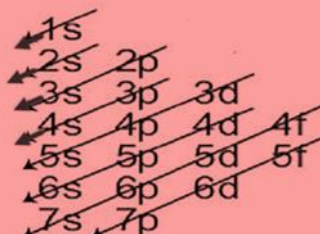
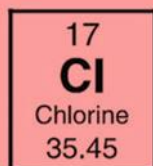


Electron Configuration Chart

s holds up to 2

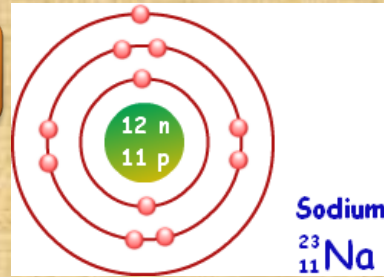
p holds up to 6

d holds up to 10

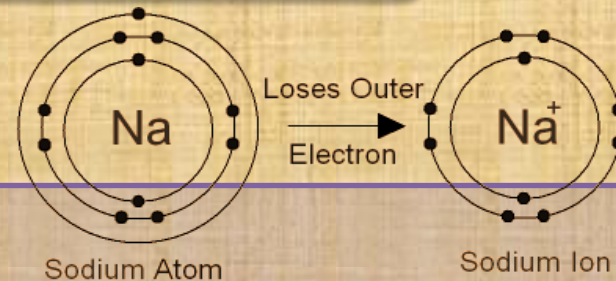


Q: What will be the difference between Electronic Configuration of Na and Na⁺¹?

Sodium atom Na

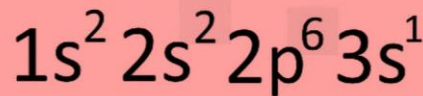
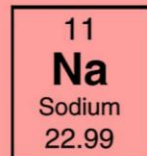


Sodium ion Na⁺¹



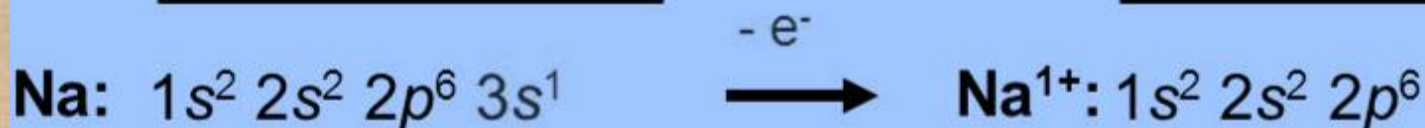
Electron Configuration Chart

s holds up to 2 p holds up to 6 d holds up to 10



Atoms

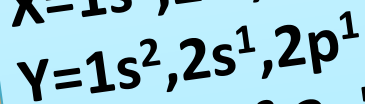
Ions



Plenary

- (i) How many sub-shells are there in shell N?
- (ii) Give notation for sub-shells of M shell.

(iii) The electronic configurations listed are in correct. Explain what mistake has been made in each.



(iv) Which orbital in each of the following pairs is lower in energy?

- (a) $2s, 2p$ (b) $3p, 2p$ (c) $3s, 4s$

Home Work



- Solve :
- Self-Assessment Exercise 2.3,(pg no.38)
- Self-Assessment Exercise 2.4,(pg no.38)
- Review Questions: 2,6,12

Let's Stop COVID-19

Stay
Home
Stay Safe



**WORK
FROM HOME**

.Allah Hafiz.

خدا حافظ

في أمان الله

May Allah protect you

[ARABIC PHRASE USED BY
WAY OF SAYING GOODBYE]

@TRUSTING TRUTHS