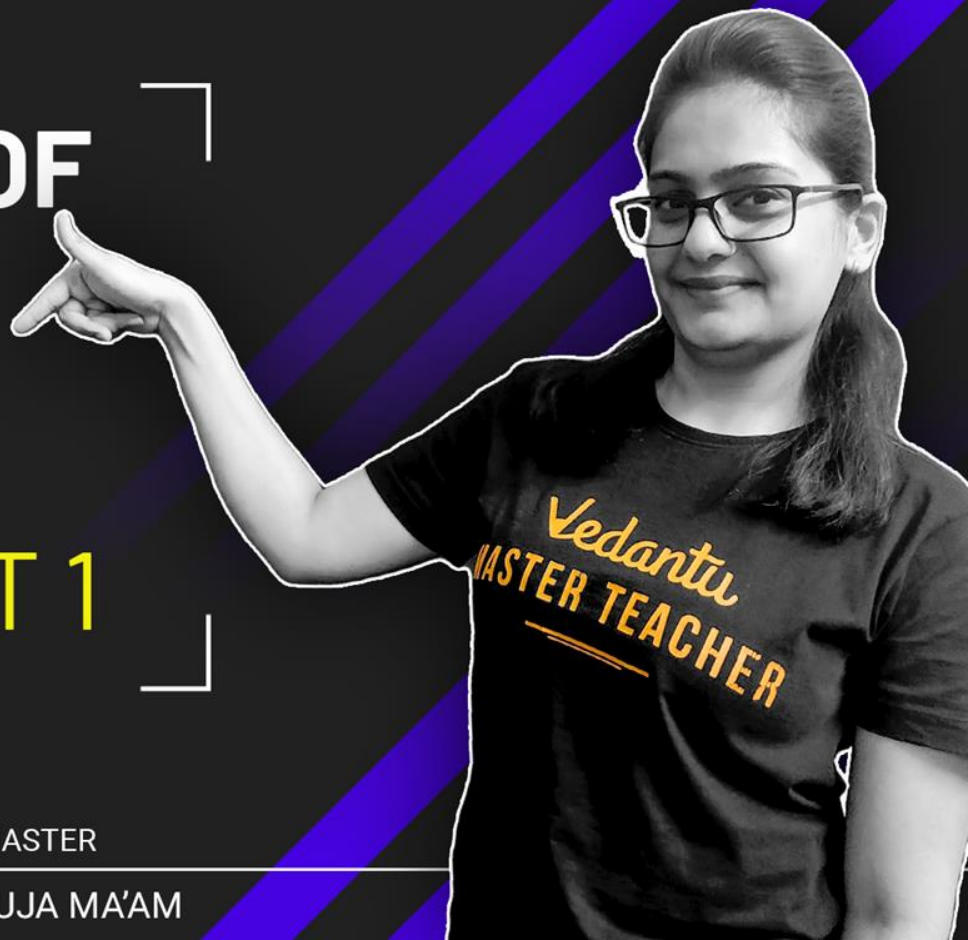
NCERT 11|12 LIVE NCERT CHEMISTRY FOR CLASS 11

CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES PART 1



CHEMISTRY MASTER

SAKSHI PAHUJA MA'AM

SAKSHI PAHUJA

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CHEMISTRY MASTER TEACHER

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MSC

COLLEGE

PUNJABI UNIVERSITY

EXPERIENCE

6 YEARS IN TEACHING FIELD

ACHIEVEMENTS

MORE THAN 70% OF MY STUDENTS FROM THE LAST 12TH BATCH SCORED MORE THAN 90% IN CBSE.

1ST SELECTION IN KVPY FROM 11TH BATCH.

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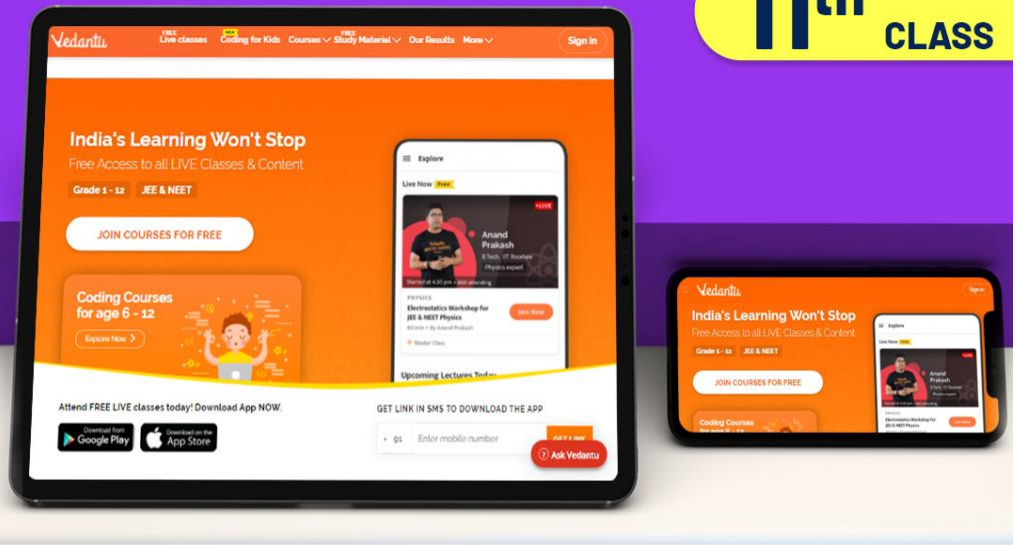
11th CLASS



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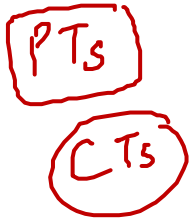

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Classification of Elements and Periodicity in properties

Si

As

Sc

H

Be

Mo

Mg

Rn

He

Na

Zn

and so on.....

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The Periodic Table

"It makes the study of elements and their properties easier.."

Modern Periodic Law

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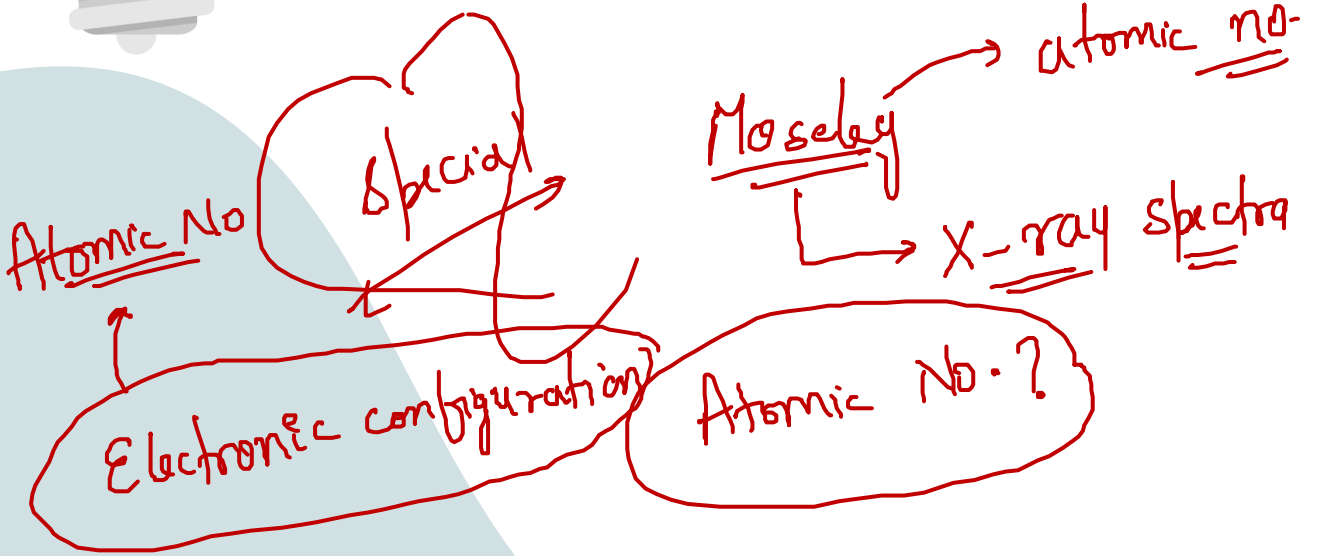
The physical and chemical properties of the elements are periodic functions of their atomic numbers.

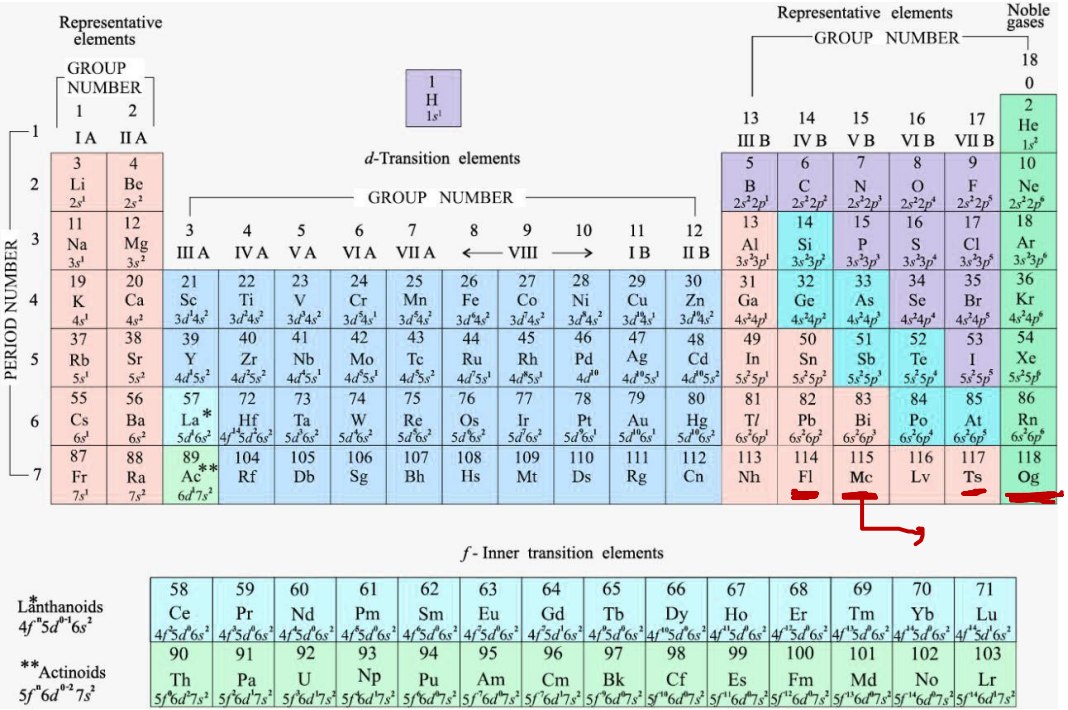


Long form of Periodic table

The horizontal rows are called periods and the vertical columns, groups.

Periods → 7

Groups → 1 to 18



Fl → Flerovium

Mc → Moscovium

Ts – Tennassine

Og → Organesson

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NOMENCLATURE OF ELEMENTS WITH ATOMIC NUMBERS > 100

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Digit	Name	Abbreviation
0	nil	n
1	un	u
2	bi	b
3	tri	t
4	quad	q
5	pent	p
6	hex	h
7	sept	s
8	oct	o
9	enn	e

→ Name of each digit + ium

Symbol → Abbreviations of each digit

first word of name

109

Unnilennium

Une

Atomic Number	Name	Symbol	IUPAC Official Name	IUPAC Symbol
101	Unnilunium	Unu	Mendelevium	Md
102	Unnilbium	Unb	Nobelium	No
103	Unniltrium	Unt	Lawrencium	Lr
104	Unnilquadium	Unq	Rutherfordium	Rf
105	Unnilpentium	Unp	Dubnium	Db
106	Unnilhexium	Unh	Seaborgium	Sg
107	Unnilseptium	Uns	Bohrium	Bh
108	Unniloctium	Uno	Hassnium	Hs
109	Unnilennium	Une	Meitnerium	Mt
110	Unnnillium	Uun	Darmstadtium	Ds
111	Ununnnium	Uuu	Rontgenium*	Rg*
112	Ununbium	Uub	*	*
113	Ununtrium	Uut	+	
114	Ununquadium	Uuq	*	*
115	Ununpentium	Uup	+	
116	Ununhexium	Uuh	*	*
117	Ununseptium	Uus	+	
118	Ununoctium	Uuo	+	

Ques) What would be the IUPAC name and symbol for the element with atomic number 120?

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120

Unbinilium

Symbol → Ubn

ANSWER
Ubn and unbinilium

ELECTRONIC CONFIGURATIONS OF ELEMENTS AND THE PERIODIC TABLE

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How to calculate no. Of elements in a period

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H

→ $1s^1$

Li Be

$1s^2$ $2s^1$ $2s^2$

He

$1s^2$

B C N O F Ne

$2p^1$ ----- $2p^6$

Al Si P S Cl Ar

Na Mg

$3s^1$

$3p^6$

4th period → 4s 3d 4p = 18 elements

1 + 5 + 3 = 9

5th → 5s 4d 5p →

6th → 6s 4f 5d 6p →

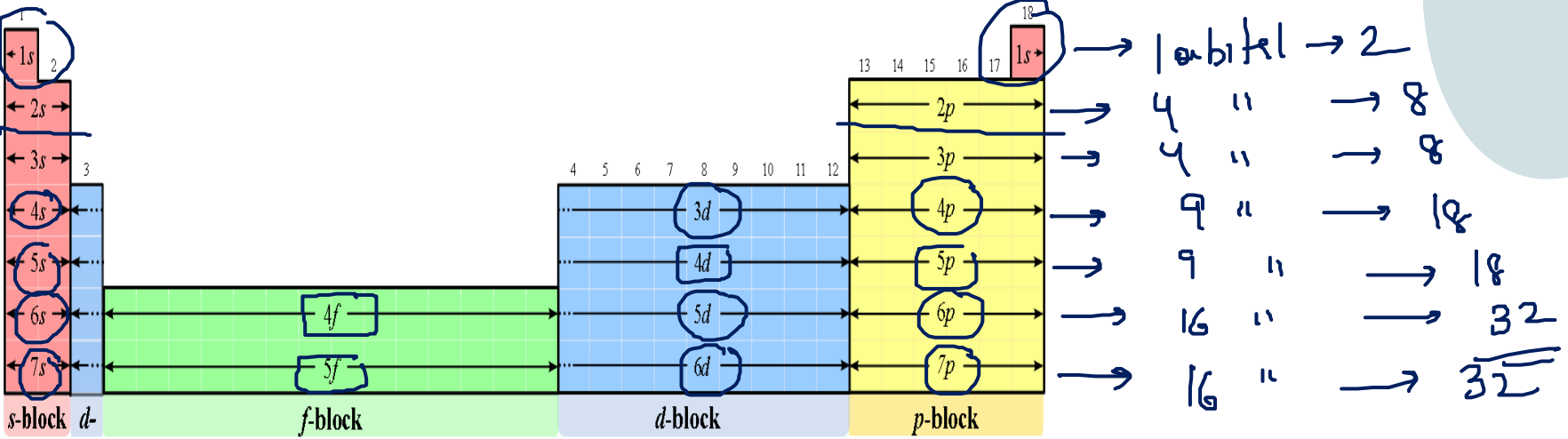
Period No. = Valence shell (n → max)

IP → 1s → 2 elements

2P → 2s + 2p → 4 orbitals → 8 elements

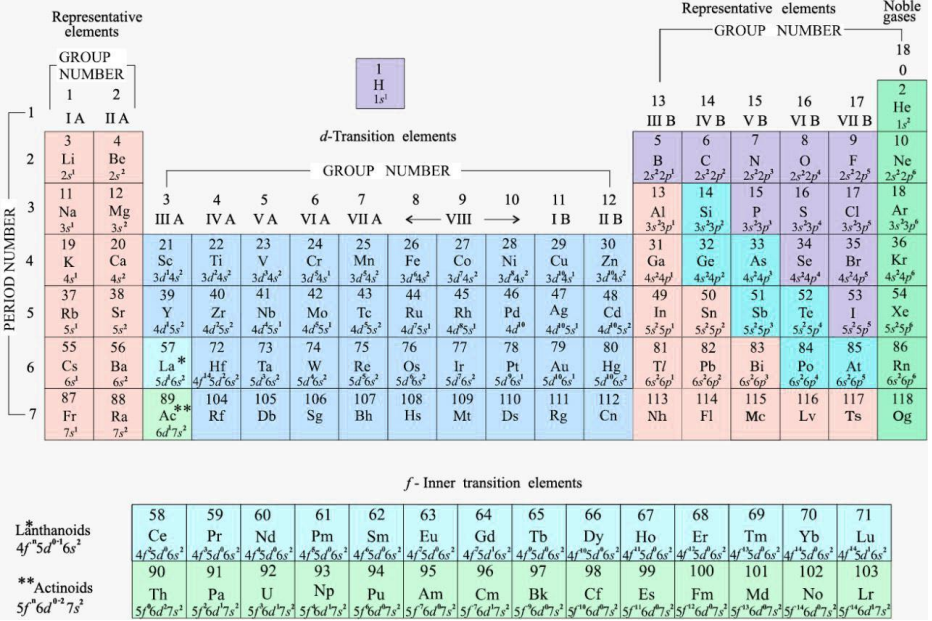
3P → 3s 3p → 8 elements

9 element



No. of elements in a period = 2 (No. of orbitals involved)

Electronic Configurations in Periods



Ques) On the basis of quantum numbers, justify that the sixth period of the periodic table should have 32 elements.

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6th period → 6s 4f 5d 6p ~~7s~~

1 + 7 + 5 + 3 = 16

No. of elements = 16 × 2 = 32

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Electronic Configurations in Groups

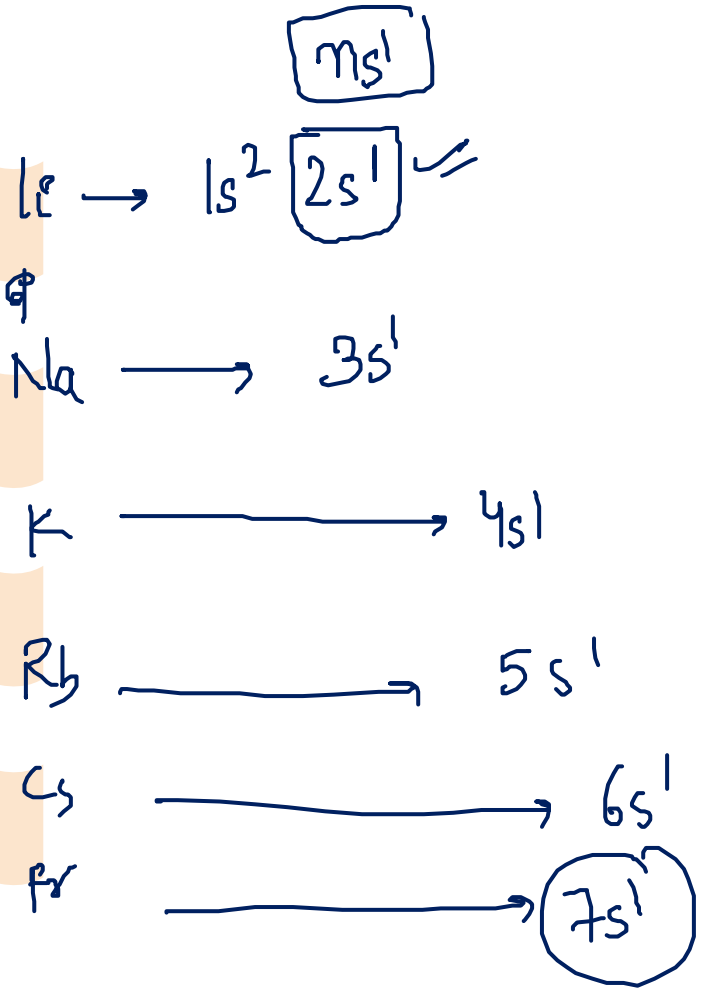
Elements in the same vertical column or group have similar valence shell electronic configurations, the same number of electrons in the outer orbitals, and similar properties.

s block

p block

d block

f block



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Ne → 10

Na → [Ne] $3s^1$

11

Atomic number	Symbol	Electronic configuration
3	Li	$1s^2 2s^1$ **(or)** [He] $2s^1$
11	Na	$1s^2 2s^2 2p^6 3s^1$ **(or)** [Ne] $3s^1$
19	K	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$ **(or)** [Ar] $4s^1$
37	Rb	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 5s^1$ **(or)** [Kr] $5s^1$
55	Cs	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^6 6s^1$ **(or)** [Xe] $6s^1$
87	Fr	[Rn] $7s^1$

→ Choose nearest noble gas ⇒ lies in one period lower

Ne → $2s^2 2p^6$ $3s^1$

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Valence e⁻ ⟶ s-orbitals

ns^{1-2}

Group No. = No. of valence e⁻s

$_{20}Ca \rightarrow [Ar]\,4s^2$

↳ 2nd group

s block

- Group 1 (alkali metals) and Group 2 (alkaline earth metals
- ns^1 and ns^2 outermost electronic configuration
- reactive metals with low ionization enthalpies
- Form 1+ ion (in the case of alkali metals) or 2+ ion (in the case of alkaline earth metals)

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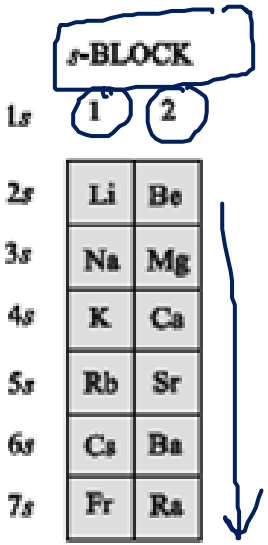
s block

- Metallic character and the reactivity increase as we go down the group
- Never found pure in nature

Alkali – metals



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13 ⟶ 18

Valence e⁻ enters p-orbitals

13 ⟶ 18

Group No ⟶ 10 + No. of valence e⁻s

Gen config ⟶ $ns^2 np^{1-6}$

p block

- Group 13 to 18
- (s block + p block) are called the Representative Elements or Main Group Elements.
- ns^2np^1 to ns^2np^6
- At the end of each period is a noble gas element with a closed valence shell ns^2 np^6 configuration

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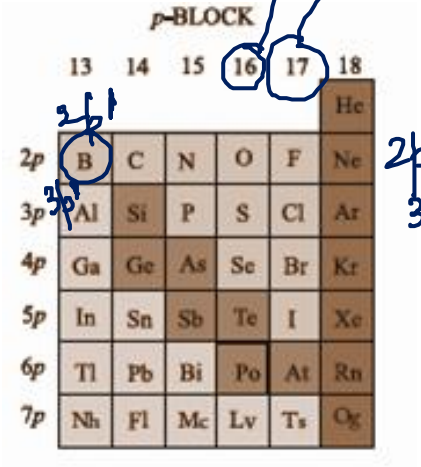
Chalcogens
Halogens → Salt forming



$2p^1$ $3p^1$ $2p^6$ $3p^6$

$ns^2\ np^{1-6}$

p block

- The halogens (Group 17) and the chalcogens (Group 16)
- Have highly negative electron gain enthalpies
- Non-metallic character increases as we move from left to right across a period and metallic character increases as we go down the group

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Valence e⁻ enters the d-subshell

d block(Transition elements)

- Group 3 to 12
- $(n-1)d^{1-10}ns^{0-2}$
- Coloured ions, exhibit variable valence (oxidation states), paramagnetism and used as catalysts

Group No. = No. of ns e⁻s & no. of (n-1) d e⁻s

$_{21}Sc \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^1$

$2+1=3$ ns^2 $(n-1)d^1$

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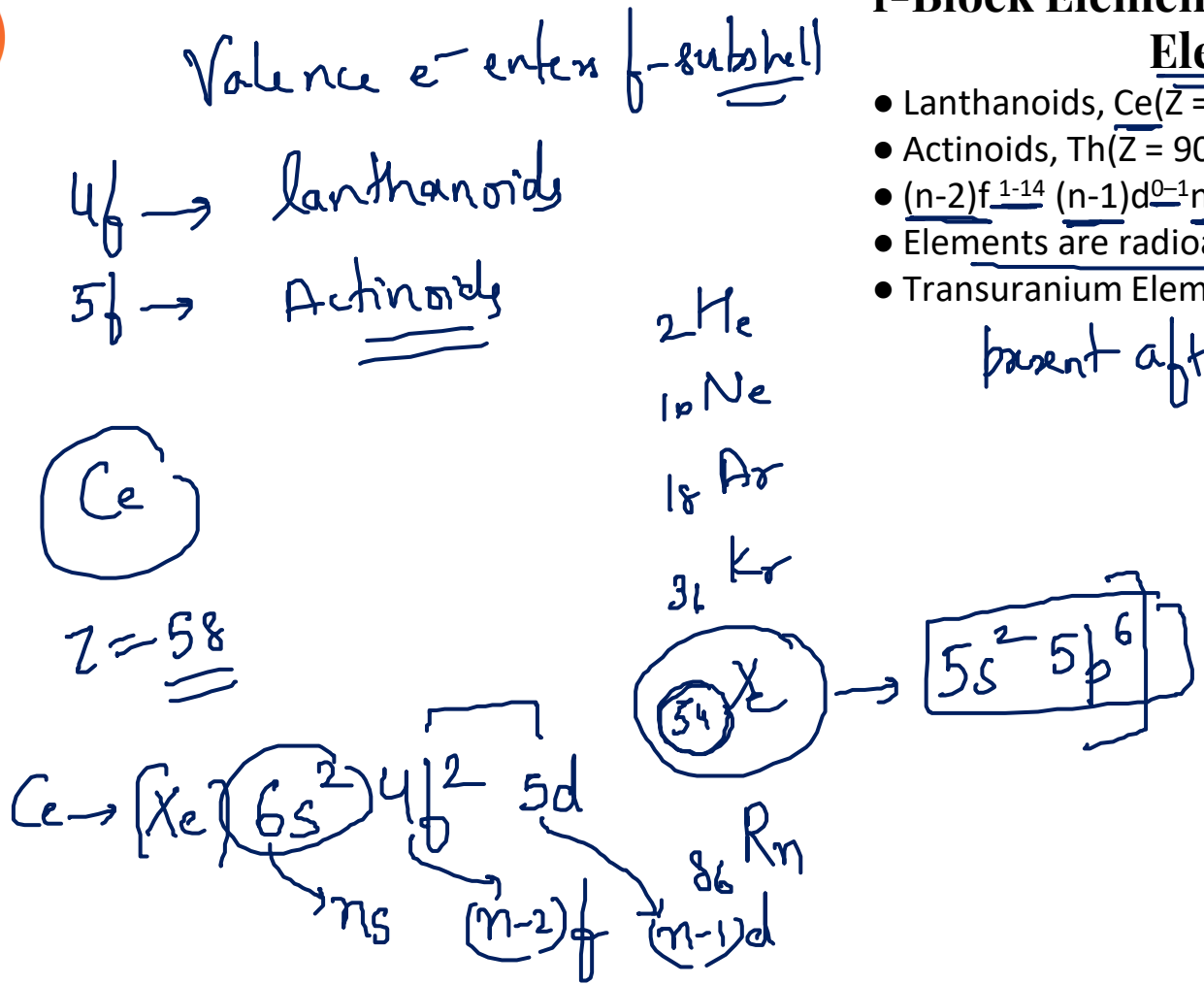
d-BLOCK

	3	4	5	6	7	8	9	10	11	12
3*d*	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
4*d*	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd
5*d*	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg
6*d*	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn

f-Block Elements (Inner-Transition Elements)

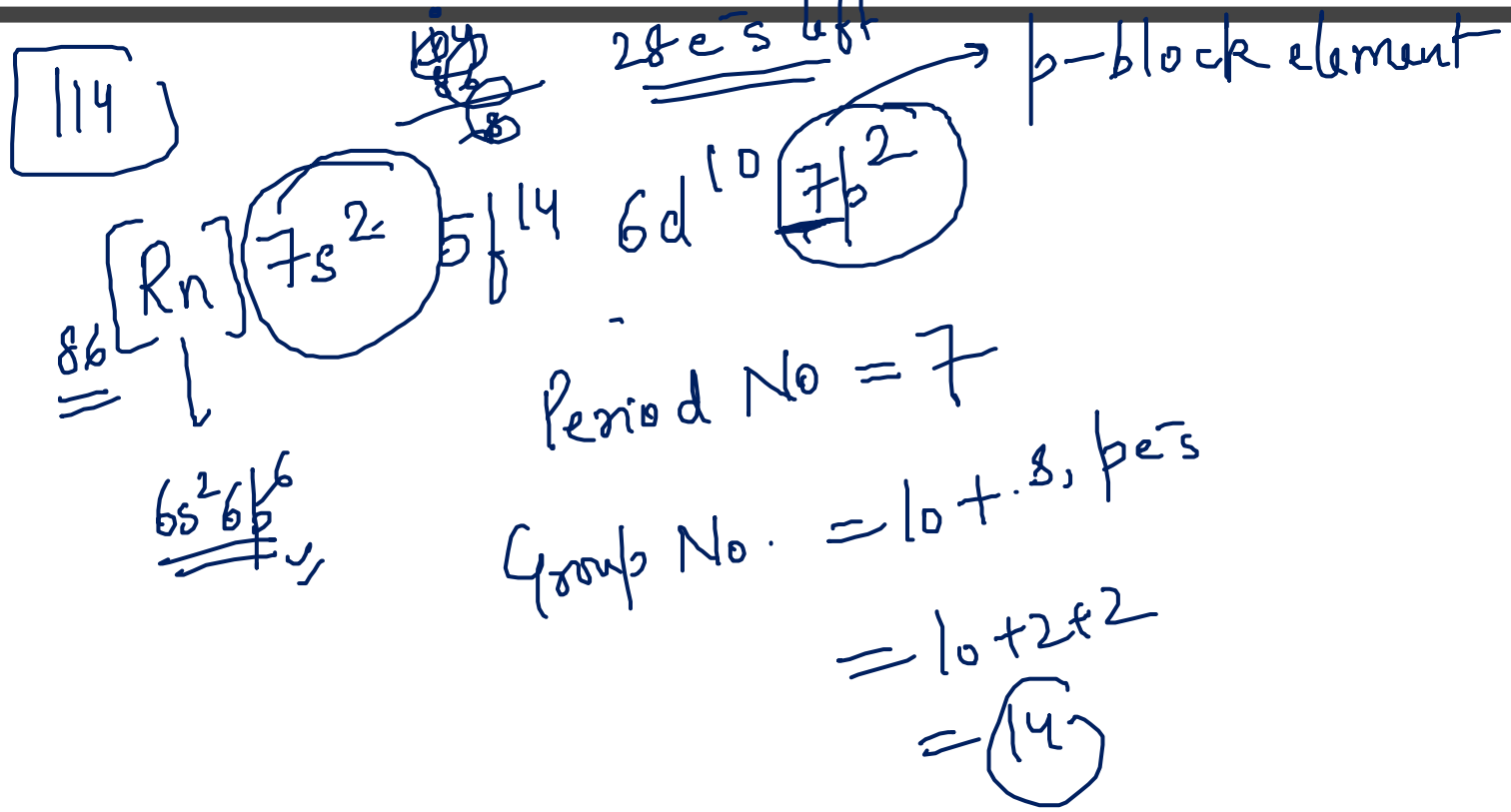
- Lanthanoids, Ce(Z = 58) – Lu(Z = 71)
- Actinoids, Th(Z = 90) – Lr (Z = 103)
- $(n-2)f^{1-14}\ (n-1)d^{0-1}ns^2$
- Elements are radioactive
- Transuranium Elements. → Elements present after Uranium



f-BLOCK

Lanthanoids *4f*	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Actinoids *5f*	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Ques) In terms of period and group where would you locate the element with Z =114?



ANSWER
Period 7
Group 14
Block p

Homework

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- Do all solved examples till 3.4
- Do exercise questions till 3.6

Question of the day

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Ques) Write the atomic number of the element present in the third period and seventeenth group of the periodic table.

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Ans + fav food

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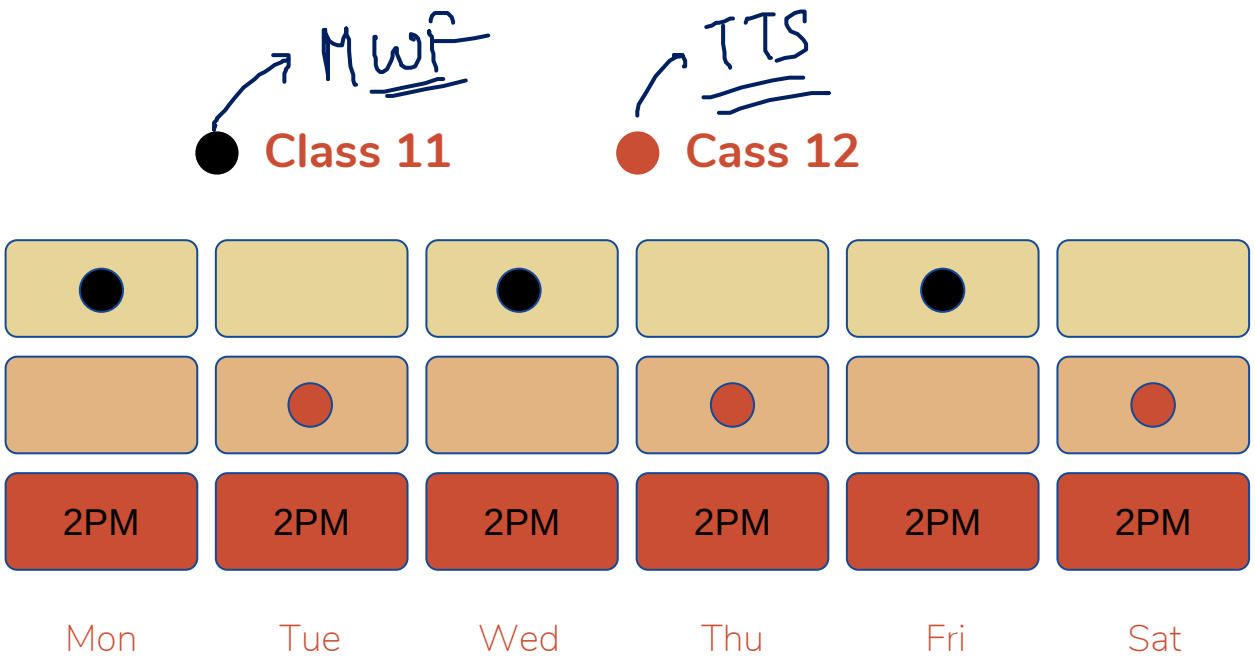
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