CHAPTER-03(17.09.20)

Classification of elements and periodicity in properties

CLASS-XI
SUBJECT-CHEMISTRY

Classification of Elements

With the discovery of a large number of elements, it became difficult to study the elements individually, so classification of elements was done to make the study easier.

Earlier Attempts to Classify Elements

Many attempts were made to classify the known elements from time to time. The earlier attempts are as follows:

Dobereiner's Triads (1829)

Dobereiner classified the elements into groups of three elements with similar properties in such a manner so that the atomic weight of the middle

element was the arithmetic mean of the other two, e.g.,

Element	Li	NA	K
Atomic weight	7	23	39

Mean of atomic masses = (7 + 39) / 2 = 23

Similarly Cl, Br, I; Ca, Sr, Ba are two more examples of such triads.

Limitations Dobereiner could not arrange all the elements known at that time into triads. He could

identify only three such triads that have been mentioned.

Newland's Octaves (1864) (Law of Octaves

Newland states that when elements are arranged in order of increasing atomic masses, every eighth element has properties similar to the first just like in the musical note [Every eighth musical note 1S the same as the first mentioned note]. This can be illustrated as given below

sa	re	ga	ma	pa	dha	ni
Li	Be	B	C	N	O	F

Na	Mg	Al	Si	P	S	Cl

Limitations

1. This classification was successful up to the element calcium.

2. When noble gas elements were discovered at a later stage, their inclusion in these octaves disturbed the entire arrangement.

Lother Meyer's Atomic Volume Curve (1869)

Meyer presented the classification of elements in the form of a curve between atomic volume and atomic masses and state that the properties of the

elements are the periodic functions of their atomic volumes.

[Here, atomic volume = molecular mass / density

He concluded that the elements with similar properties occupy similar position in the curve.

Mendeleef's Periodic Table
Mendeleefs Periodic Table is based upon Mendeleefs periodic law which states 'The physical and chemical properties of the elements are a periodic function of their atomic masses."

At the time of Mendeleef, only 63 elements were known.

K

Group →	I		II		III		IV		V		VI		VII		VIII				0
Period ↓	A	B	A	B	A	B	A	B	A	B	A	B	A	B					Zero
1	H 1.008																		He 4.003
2	Li 6.94		Be 9.01		B 10.82		C 12.01		N 14.008		O 16		F 19						Ne 20.183
3	Na 22.99		Mg 24.32		Al 26.98		Si 28.09		P 30.975		S 32.06		Cl 35.46						Ar 39.944
4	K 39.10	Cu 63.54	Ca 40.08	Zn 65.38	Sc 44.96	Ga 69.72	Ti 47.90	Ge 72.60	V 50.95	As 74.91	Cr 52.01	Se 78.96	Mn 54.94	Br 79.91	Fe 55.85	Co 58.94	Ni 58.69		Kr 83.80
5	Rb 85.48	Ag 107.88	Sr 87.63	Cd 112.41	Y 88.92	In 114.76	Zr 91.22	Sn 118.70	Nb 92.91	Sb 121.76	Mo 95.95	Te 127.61	Tc 99	I 126.9	Ru 101.1	Rh 102.91	Pd 106.7		Xe 131.3
6	Cs 132.91	Au 197.0	Ba 137.36	Hg 200.61	La 138.92	Tl 204.39	Hf 178.6	Pb 207.21	Ta 180.92	Bi 209	W 183.92	Po 210	Re 186.31	At (210)	Os 190.2	Ir 192.2	Pt 195.23		Rn 222
7	Fr 223		Ra 226.05		Ac 227														

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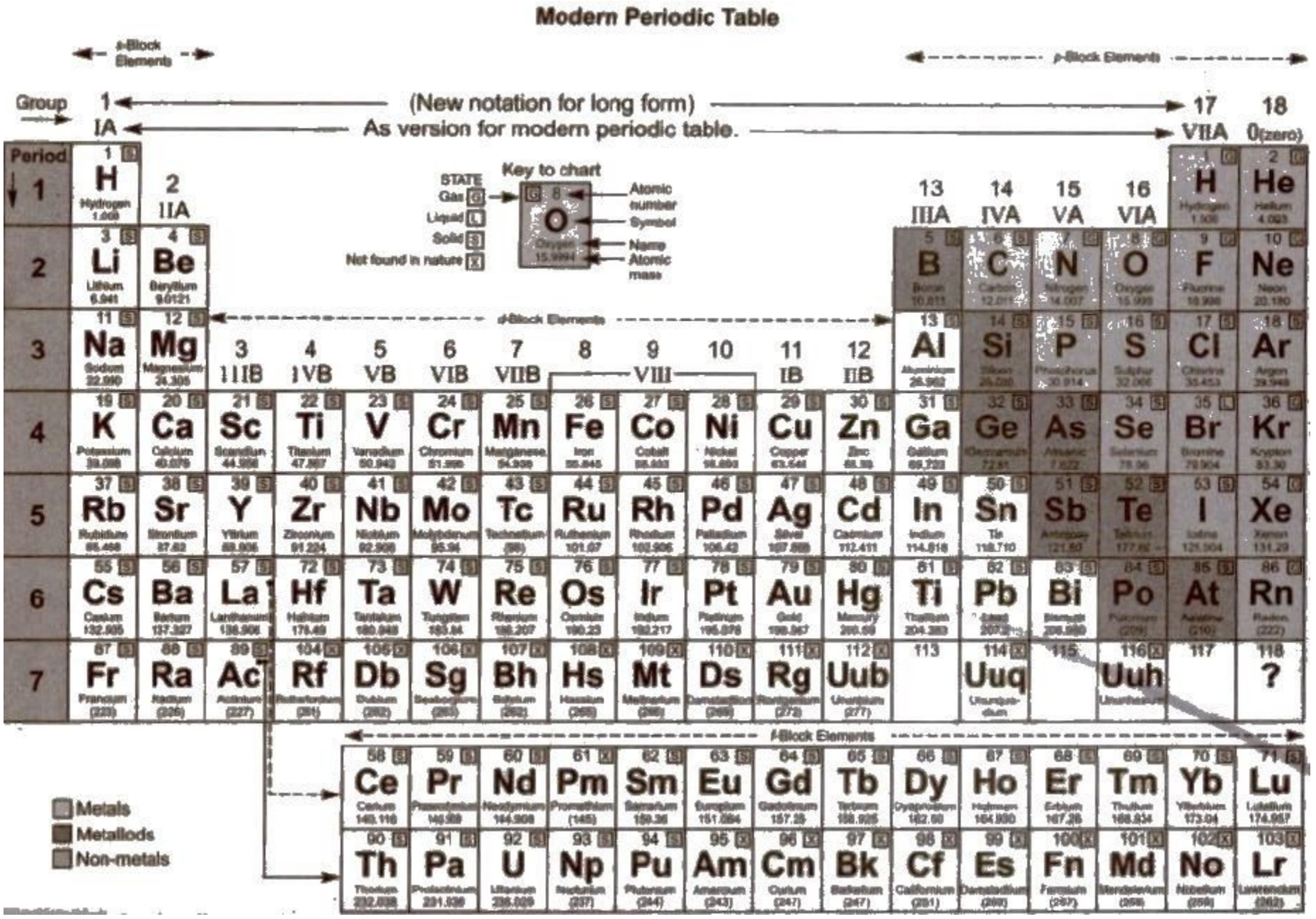
Modern Periodic Table
s-Block Elements
p-Block Elements
Group 1 IA
(New notation for long form)
As version for modern periodic table.
17 VIIA
18 0(zero)
Period
Key to chart
STATE
Gas G
Liquid L
Solid S
Not found in nature X
Atomic number
Symbol
Name
Atomic mass
2 IIA
13 IIIA
14 IVA
15 VA
16 VIA
d-Block Elements
3 IIIB
4 IVB
5 VB
6 VIB
7 VIIB
8
9 VIII
10
11 IB
12 IIB
f-Block Elements
Metals
Metalloids
Non-metals

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

Z	101	102	103	104	105	106	107	108	109	110
IUPAC name	Unnilunium	Unnilbium	Unniltrium	Unnilquadium	Unnilpentium	Unnilhexium	Unnilseptium	Unniloctium	Unnilenniu m	Ununnilium
Symbol	Unu	Unb	Unt	Unq	Unp	Unh	Uns	Uno	Une	Uun