Periodic classification of Elements



Drawbacks: (a) All known elements with similar chemical properties did not form triads.

Example \rightarrow N, P, As

Atomic mass (u) \rightarrow 14, 31, 74.5

(b) Elements that don't have similar chemical properties form a triad.

Example \rightarrow C, N, O **Atomic mass (u)** \rightarrow 12, 14, 16

(iii) Newlands law of octaves

Basis of classification: (\uparrow) atomic mass of elements

Idea: In Indian music system, eighth musical note is similar to first one.

sa, re, ga, ma, pa, da, ni, (sa

Newlands applied the same analogy for elements -

Every eighth element has properties similar to first one when arranged in order of (\uparrow) atomic mass.

Indian musical notes	sa	rc	ga	ma	pa	da	ni	
Western musical notes	(do)	(re)	(mi)	(fa)	(so)	(la)	(ti)	
	Н	Li ^{1st}	Be ^{2nd}	B^{3rd}	C^{4th}	$\mathrm{N}^{5\mathrm{th}}$	O^{6th}	
	F ^{7th}	Na ^{8th}						
Drawbacks: (a) Classifi	cation app	licable up to o	calcium (Ca) i	.e. for light	er elements	up to 40 u.		
(b) Newlands assumed t	hat only 56	elements exi	sted in nature	& no more	elements w	vill be disco	vered in future.	
(c) Newlands put <u>unlike</u>	elements in	n some colum	<u>n</u> & <u>like elen</u>	nents in dif	ferent colun	<u>nn</u> .		
	\downarrow				\downarrow			
Example: Co and Ni	with F, Cl a	and Br	Exampl	e: Fe, Co	& Ni in diff	erent colum	ins	
(d) Noble gases \rightarrow disc element \rightarrow 'Law of c	covered aft octaves bec	er Newlands ome irreleva	classification	\rightarrow every 1	ninth eleme	nt shows si	milar property to	that of first
(iv) Mendeleev's periodic t	able ']	Father of Peri	odic Table'					
Basis of classification:	Similar ch got arrang	nemical prope ged in order of	erties of eleme f (\uparrow) atomic m	nts (Formu ass.	la of oxides	& hydride	$s) \rightarrow Elements aut$	tomatically
Idea: Mendeleev obser	ved a recur	rence of phys	ical & chemic	al propertie	es after regu	lar interval	S.	
Mendeleev's periodic la	aw	→ Physical	& chemical p	roperties ar	e periodic	function of	their atomic mass	ses.
Mendeleev's periodic tal	ble: No. of	rows (periods	$(s) \rightarrow 7$	1	-		Repetition	of
I II I	No of	columns (gro	$(uns) \rightarrow 8$				things/proper	rties
Achievements of Mend	eleev's ner	iodic table	"ps) / c				after a fixe	d
(a) Prediction of new el	ements & t	heir propertie	es. He left gap	s for these	undiscovere	d elements	and were named a	as:
• (eka-boron	1 1	• eka-alumin	ium	• eka-s	Firs	t element after	
After discovery	r				Sar	skrit numer	ral	
elements								
	↓ ↓		↓ ↓		¥			
Scan	dium (Sc)		Gallium (Ga))	Germun	ium (Ge)		
(b) Correction of doubth vacant space C &	ful atomic r N. Hence,	masses $\rightarrow At$ its mass was	that time mass corrected.	of Be was	13.5 u but i	n Mendelee	v's periodic table	there was no
\downarrow	\downarrow							
12 u 1	l4u							
(c) Noble gases were dis	scovered af	ter Mendelee	v gave his perio	odic table –	\rightarrow They can	be placed in	i zero group withou	ut disturbing
Drawbacks of Mendele	ev's nerio	dic table:						
(a) Anomolous position alkali metals & halo	of hydrog	en: Hydroger	n could not be	assigned a	correct pla	ce due to sin	milarity of propert	ties between
(b) Anamolous position	of isotope	s: Isotopes \rightarrow	same chemic	al propertie	$es \rightarrow should$	l have same	e position in perio	odic table
			But \downarrow					
Isoto	opes \rightarrow diff	ferent mass –	> different po	sition in p	eriodic tabl	e		
(c) Wrong order of atom	nic masses:	Co with high	ner atomic mas	ss was plac	ed before N	i. Similarly	, Te was placed	
before I.								
		$ $ Co \rightarrow Cob	oalt (58.93 u)					
		$ $ Ni \rightarrow Nicl	kel (58.71 u)					

Te \rightarrow Tellurium (127.60 u) I \rightarrow Iodine (126.90 u) Modern Periodic Table \rightarrow No. of rows (periods) \rightarrow 7

No. of columns (groups) $\rightarrow 18$

Basis of classification: (\uparrow) atomic number of elements

 \downarrow

number of protons present in nucleus

Modern periodic law: Physical and chemical properties of elements are periodic function of their atomic numbers.

No. of shells \rightarrow Period number No. of valence electron(s) \rightarrow Group number

KLMKLExamples \rightarrow Sodium (Na)281Fluorine (F)27Period No. \rightarrow 3Period no. \rightarrow 2Group No. \rightarrow 1st \rightarrow 1AGroup no. \rightarrow 7th \rightarrow 7A or 17

