

- 1 In 1864 a scientist named John Newlands worked on arranging elements into a table. The table is shown below.

The elements were arranged in order of their relative atomic masses.

Elements with similar properties were placed in vertical columns.

He called this pattern the 'Law of Octaves'.

H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe
Co/Ni	Cu	Zn	Y	In	As	Se
Br	Rb	Sr	Ce/La	Zr	Di/Mo	Ro/Ru
Pd	Ag	Cd	U	Sn	Sb	Te
I	Cs	Ba/V	Ta	W	Nb	Au
Pt/Ir	Tl	Pb	Th	Hg	Bi	Os

- 1 (a) (i) Why did he call his pattern the 'Law of Octaves'?

[2 marks]

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- 1 (a) (ii) Some scientists did not agree with the way the elements were arranged.

Use your knowledge of the chemistry of the elements and examples from the table above to suggest why some scientists did not agree with the arrangement of elements.

[3 marks]

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- 1 (b) Another scientist called Dimitri Mendeleev worked on the arrangement of elements into a table. In Mendeleev's table, most of the elements were put in order of increasing relative atomic mass, and spaces were left for elements that Mendeleev thought would be discovered in the future.

Here is part of Mendeleev's table for group 3 elements, with a gap.

Group 3
Boron
Aluminium
?
Indium
Thallium

Some scientists were critical of Mendeleev's table.

Suggest why scientists might have been critical of Mendeleev's table.

[2 marks]

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- 1 (b) (i) A few years after this table was developed, an element was discovered that fitted into the space in the above group.

Suggest why the discovery of this element convinced other scientists that Mendeleev's table was correct.

[1 mark]

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(Total 8 marks)

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