



▲ In 1893, Scottish chemist William Ramsay isolated a previously unknown component of the atmosphere.

Groups	III	IV	V	VI	VII	VIII	I	II	III	IV	V	VI	VII	0	I	II
Periods	b	b	b	b	b	b	b	b	a	a	a	a	a		a	a
1															H	He
2															Li	Be
3									B	C	N	O	F	Ne	Na	Mg
4									Al	Si	P	S	Cl	Ar	K	Ca
5	Sc	Ti	V	Cr	Mn	Fe Co Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	Rb	Sr
6	Y	Zr	Nb	Mo	Tc	Ru Rh Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	Cs	Ba
7	La	Hf	Ta	W	Re	Os Ir Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	Fr	Ra
8	Ac															
	Transition elements								Main-group elements							

▲ This version of the periodic table shows how it looked after the discovery of the noble gases. The placement of the Group 1 and 2 elements at the far right of the table shows clearly how the noble gases fit in between the chlorine family and the potassium family of elements. The 0 above the noble-gas family indicates the zero valency of the gases.

the families of both chlorine and potassium was one, perhaps argon fit in between them.

Ramsay's insight that argon merited a new spot between the halogen family and the alkali metal family on the periodic table was correct. And as Ramsay would soon confirm, his newly discovered gas was indeed one of a previously unknown family of elements.

### New Neighbors

In 1895, Ramsay isolated a light, inert gas from a mineral called *cleveite*. Physical analysis revealed that the gas was the same as one that had been identified in the sun in 1868—helium. Helium was the second zero-valent element found on Earth, and its discovery made chemists aware that the periodic table had been missing a whole column of elements.

Over the next three years, Ramsay and his assistant, Morris Travers, identified three more inert gases present in the atmosphere: neon (Greek for "new"), krypton ("hidden"), and xenon ("stranger"). Finally in 1900, German chemist Friedrich Ernst Dorn discovered radon, the last of the new family of elements known today as the *noble gases*. For his discovery, Ramsay received the Nobel Prize in 1904.

### Questions

1. What evidence led Ramsay to report that the mysterious gas was inert?
2. What property of argon caused Ramsay to propose a new column in the periodic table?

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