

Information Sheet: James Andrew Harris (1932 - 2000)

This information sheet is designed for teachers only.

James Andrew Harris made fantastic contributions to chemistry which are crucial in industry today. He earned a bachelor's degree in chemistry from Huston-Tillotson College, Texas. It was at Lawrence Berkeley National Laboratory, where he carried out the work, he's most known for. Unlike his colleagues, James Andrew Harris did not have a PhD, but it was due to his skills and scientific knowledge, that his team discovered two elements: element 104, rutherfordium, and 105, dubnium.

After looking at the KS5 national curriculum, it is evident that his contributions to chemistry can be highlighted. The curriculum states: 'structure and electronic configuration of atoms (up to $Z = 36$) in terms of main energy levels and s, p and d orbitals.'

Students should know how to work out the electron configuration of atoms up to $Z = 36$. Even though James Andrew Harris didn't discover one of these elements, he co-discovered element 104, rutherfordium, and 105, dubnium. Students are not examined on these elements, but they should still have a brief understanding of them as they are also elements of the current periodic table.

Fact Sheet: James Andrew Harris (1932 - 2000)

James Andrew Harris grew up in Texas and California. In 1953, he earned a bachelor's degree in chemistry from Huston-Tillotson College, Texas. After graduating he found it extremely difficult to find work because of racial discrimination. In 1955, James Andrew Harris finally found a job as a radiochemist at Tracer lab in California, where he stayed for 5 years.

In the 1960s and 1970s, whilst working at the Lawrence Berkeley National Laboratory where he carried out the work, he is most known for. James Andrew Harris despite not having a PhD, lead the Heavy Isotopes Production Group as a part of the Nuclear Chemistry Division. His main role was to prepare targets for the discovery of heavy elements. While working with James Andrew Harris, famous nuclear chemist Albert Ghiorso once said that James Andrew Harris's targets, for the discovery of heavy elements, was "*the best ever made for heavy element research.*" Due to James Andrew Harris's skills and scientific knowledge, his team discovered two elements: element 104, rutherfordium, and 105, dubnium. James Andrew Harris is the first African American who took part in a major new-element identification programme.



The Berkeley lab team at the Lawrence Berkeley National Laboratory.
From left: Matti Nurmi, James Andrew Harris, Kari Eskola, Pirkko Eskola, and Albert Ghiorso. (Picture credit: Berkeley Lab).

References:

<https://www.acs.org/content/acs/en/education/whatischemistry/african-americans-in-sciences/james-andrew-harris.html>

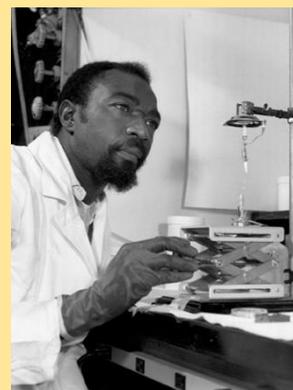
<https://chemistry.berkeley.edu/news/james-andrew-harris-and-element-discovery-berkeley-lab>

Electron Configuration Activity 1

For each element write their electron configurations:

- 1) sodium
- 2) bromine
- 3) calcium
- 4) oxygen
- 5) neon
- 6) boron
- 7) zinc
- 8) iron
- 9) scandium
- 10) potassium

James Andrew Harris was the first African American to participate in a major new-element identification programme. He was a co-discoverer of elements 104, rutherfordium, and 105, dubnium.

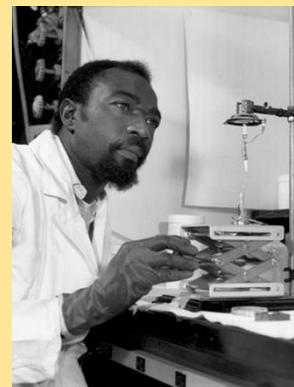


Electron Configuration Activity 2

For each electron configurations, identify which element they belong to:

- 1) $1s^2 2s^1$
- 2) $1s^2 2s^2 2p^6 3s^2 3p^5$
- 3) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$
- 4) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$
- 5) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$
- 6) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$
- 7) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^1$
- 8) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^9$
- 9) $1s^2 2s^2 2p^2$
- 10) $1s^2 2s^2 2p^6 3s^2 3p^4$

James Andrew Harris was the first African American to participate in a major new-element identification programme. He was a co-discoverer of elements 104, rutherfordium, and 105, dubnium.



Electron Configuration Activity 1 Answers

- 1) $1s^2 2s^2 2p^6 3s^1$
- 2) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$
- 3) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
- 4) $1s^2 2s^2 2p^4$
- 5) $1s^2 2s^2 2p^6$
- 6) $1s^2 2s^2 2p^1$
- 7) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$
- 8) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$
- 9) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$
- 10) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

Electron Configuration Activity 2 Answers

- 1) lithium
- 2) chlorine
- 3) vanadium
- 4) nickel
- 5) krypton
- 6) selenium
- 7) gallium
- 8) copper
- 9) carbon
- 10) sulfur