

Virtual Elements Have Chemistry

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GLASGOW, Scotland -- To British artist Murray Robertson, the Periodic Table is a panoramic landscape. Hydrogen and helium sharp peaks rise from a quiet metal sea. A magnesium valley extends to a sodium gorge.

In a multimedia exhibit here, Robertson has created 3-D models that help chemistry students better understand the eye-glazing memorization of atomic properties by transforming data into a visual wonderland.

The "109" exhibit is supported by the Royal Society of Chemistry and currently on display at the [Gallery of Modern Art in Glasgow](#)

Robertson produced the series of animated 3-D landscapes by rendering the physical properties of the 109 officially recognised elements as mountains and canyons.

It's a pretty spin on the Periodic Table, the system created in 1869 by [Dmitri Mendeleev](#) to arrange all known chemical elements in order of increasing atomic number.

The Table may be a powerful tool to understand the properties and behaviour of matter's fundamental bricks, but it's not so loved by students who struggle to memorize the differences between titanium and technetium. Robertson's work attempts to make abstract concepts such as atomic weight and bonding radius more tangible.

"Those striking representations of the elements bring an appreciation of the complexity of the chemical reality which underlies the universe, and promotes the subject as being exciting and full of potential," said David Watson, senior lecturer in analytical chemistry at Strathclyde University in Glasgow.

Robertson started from 2-D diagrams illustrating different characteristics of the elements, including the mass, atomic ray, and ionization energy. He turned the graphs into 3-D grayscale height maps, and then created the fractal dramatic landscapes according to the maps.

The height of the mountains and width of the canyons represent densities, energies, atomic masses, or radii.

In the basement of Glasgow Gallery of Modern Art, a large screen allows visitors to enter an Ionization Energies landscape, step on the Smooth Transition Metals highlands, and view the hydrogen, helium and fluorine pillars towering in the foreground.

The view renders the amount of energy needed to pull out the outermost electron from each atom, a quantity that effects the way substances react and bind together.

"The scene is impressive," student Julianne Campbell said after touring the Museum, "but I think the scientific content behind the pictures is not so clear. You need a caption to understand the meaning."

The exhibit also features 109 symbolic images representing the physical, historical, and social attributes of each element.

The first is "Hydrogen Blues," the orbit of a lonely electron surrounding a blue atomic nucleus. Impressive solar flares illustrate helium, which means "sun" in Greek.

"E=mc²," an artistic view of Einstein's theory, represents einsteinium, a radioactive metal isolated in 1952 in the debris of a hydrogen bomb test in the Pacific Ocean. Shiva, the Hindu deity of destruction and creation, represents plutonium, the radioactive element used in nuclear weapons.

The 109 pictures can be seen on the [Chemistry Society](#) site. The exhibit runs through to 9 April.