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INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

INORGANIC CHEMISTRY DIVISION*

NAME AND SYMBOL OF THE ELEMENT WITH ATOMIC NUMBER 111

(IUPAC Recommendations 2004)

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Name and symbol of the element with atomic number 111*

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Abstract: A joint IUPAC–IUPAP Working Party (JWP) confirmed the discovery of element number 111. In accord with IUPAC procedures, the discoverers proposed a name and symbol for the element. The Inorganic Chemistry Division recommended this proposal for acceptance, and it was adopted by IUPAC on 1 November 2004. The recommended name is roentgenium with symbol Rg.

INTRODUCTION

In 1998, a joint Working Party (JWP) composed of four independent experts from IUPAC and IUPAP was established to determine priority of claims for the discovery of elements 110, 111, and 112. Since then, the JWP has continued its examination of the potential discovery of elements with atomic numbers equal to or greater than 110. In considering documentation solicited from and submitted by claimant laboratories, the JWP used the criteria established in 1992 by the IUPAC–IUPAP Transfermium Working Group [1–3], and reinforced by the JWP in their first report [4]. The first JWP report, published in 2001, confirmed discovery of the element with atomic number 110 by the collaboration of Hofmann et al. [5]. This led to element 110 being named darmstadtium with symbol Ds [6]. In 2003, the JWP published a second report [7], establishing that the claim by the Hofmann et al. research collaboration at Gesellschaft für Schwerionenforschung mbH (GSI) in Darmstadt, Germany [8,9] fulfilled the criteria for the discovery of element 111. Prior to publication, the 2003 JWP report was sent to each of the claimant laboratories to be checked for technical accuracy. It was also reviewed by independent expert referees. The findings of the 2003 JWP report have been formally accepted by both Unions.

RECOMMENDATION

The 2003 JWP report [7] concluded that the criteria for discovery of an element had been fulfilled only in the case of element 111 and this by the collaboration of Hofmann et al. [8,9]. Following this assignment and in accordance with the procedures established by IUPAC for the naming of elements [10], the discoverers at GSI were invited to propose a name and symbol for element 111. The discoverers propose the name roentgenium and the symbol Rg.

This proposal lies within the long-established tradition of naming elements to honor famous scientists. Wilhelm Conrad Roentgen [11] discovered X-rays in 1895. Their use has subsequently revolutionized medicine, found wide application in technology, and heralded the age of modern physics based on atomic and nuclear properties. In 1901, Roentgen was awarded the first Nobel Prize in Physics. The names of the previously discovered elements in row 7 of the Periodic Table also include the names of a series of scientists who have achieved fame in the areas of nuclear chemistry and nuclear physics, and this proposal follows that precedent. The Division Committee of the Inorganic Chemistry Division considered the proposal and recommended to the IUPAC Bureau and Council that the name roentgenium and symbol Rg for element 111 be accepted. Provisional recommendations of the name and symbol were made available for review and comment in May 2004. The final recommendation, effective 1 November

*The element with atomic number 111 under the IUPAC systematic (provisional) naming system was referred to as unununium, symbol Uuu, prior to this recommendation.

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2004, was approved by the IUPAC Bureau on 2 October 2004, as authorized by the IUPAC Council on 16 August 2003, subject to no adverse comments being received between then and 31 October 2004.

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10. W. H. Koppenol. "Naming of new elements", *Pure Appl. Chem*. **74**, 787–791 (2002).
11. The original German spelling of the name of the 1901 Nobel Prize in Physics Laureate was Wilhelm Conrad Röntgen. This spelling is encountered in many references.