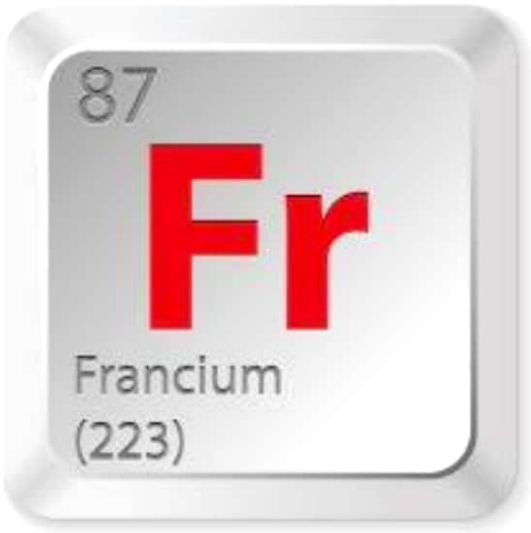
FRANCIUM

BY-PRIYANK VASHISHT

INTRODUCTION

Francium is a chemical element with the symbol Fr and atomic number 87. Prior to its discovery, it was referred to as eka-caesium. It is extremely radioactive; its most stable isotope, francium-223 (originally called actinium K after the natural decay chain it appears in), has a half-life of only 22 minutes.



HISTORY

As early as 1870, chemists thought that there should be an alkali metal beyond caesium, with an atomic number of 87.[5] It was then referred to by the provisional name eka-caesium.[28] Research teams attempted to locate and isolate this missing element, and at least four false claims were made that the element had been found before an authentic discovery was made.

OCCURRENCE

223Fr is the result of the alpha decay of 227Ac and can be found in trace amounts in uranium minerals.[6] In a given sample of uranium, there is estimated to be only one francium atom for every 1 × 1018 uranium atoms.[23] It is also calculated that there is a total mass of at most 30 g of francium in the Earth's crust at any given time.

ISOTOPES

There are 34 known isotopes of francium ranging in atomic mass from 199 to 232.[16] Francium has seven metastable nuclear isomers.[6] Francium-223 and francium-221 are the only isotopes that occur in nature, with the former being far more common. [17]

Francium-223 is the most stable isotope, with a half-life of 21.8 minutes,[6] and it is highly unlikely that

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PRODUCTION

Francium can be synthesized by a fusion reaction when a gold-197 target is bombarded with a beam of oxygen-18 atoms from a linear accelerator in a process originally developed at the physics department of the State University of New York at Stony Brook in 1995 [38] Depending on the energy of the oxygen beam, the reaction can yield francium isotopes with masses of 209, 210, and 211

UNIQUE FACT

Francium is extremely rare. Because of this its chemical and physical properties are not known. It has been studied by radiochemical techniques, which show that its most stable state is the ion Fr^+. Francium is the least electronegative of all the known elements.

Uses of Francium

- Francium is very radioactive and when it is placed in water a chemical reaction occurs and it explodes.
- Francium is mostly used for scientific research.

PHYSICAL PROPERTIES

Atomic number

87

Atomic mass

(233) g mol -1

Electronegativity according to Pauling

0.7

Density

unknown

Melting point

27 °C