*** Name Origin:**

After the state and University of California.

*** Sources:**

Made by bombarding curium with helium ions.

*** Uses:**

Californium is available only in very small quanities so its uses are limited, however, it is used in nuclear research as a source of fission fragments. It is also useful as a neutron sorce for activation analysis to detect gold or silver. It can also be used in moisture gauges in oil wells.

*** Additional Notes:**

Californium, the sixth transuranium element to be discovered, was produced by bombarding microgram quantities of ^{242}Cm with 35 MeV helium ions in the Berkeley 60-inch cyclotron. Californium (III) is the only ion stable in aqueous solutions, all attempts to reduce or oxidize californium (III) having failed. The isotope 249Cf results from the beta decay of ^{249}Bk while the heavier isotopes are produced by intense neutron irradiation by the reactions:

$$^{249}(n,\Upsilon)\rightarrow{}^{250}Bk\rightarrow\beta\rightarrow{}^{250}Cf \text{ and } {}^{242}Cf(n,\Upsilon)\rightarrow{}^{250}Cf$$

followed by

$$^{250}Cf(n,\Upsilon)\rightarrow{}^{251}Cf(n,\Upsilon)\rightarrow{}^{252}Cf$$

The existence of the isotopes ^{249}Cf, ^{250}Cf, ^{251}Cf, and ^{252}Cf makes it feasible to isolate californium in weighable amounts so that its properties can be investigated with macroscopic quantities. Californium-252 is a very strong neutron emitter. One microgram releases 170 million neutrons per minute, which presents biological hazards. Proper safeguards should be used in handling californium. Eighteen isotopes of californium are now recognized. ^{249}Cf and ^{252}Cf have half-lives of 351 years and 900 years, respectively. In 1960 a few tenths of a microgram of californium trichloride, $CfCl_3$, californium oxychloride, CfOCl, and californium oxide, Cf_2O_3, were first prepared. Reduction of californium to its metallic state has not yet been accomplished. Because californium is a very efficient source of neutrons, many new uses are expected for it. It has already found use in neutron moisture gages and in well-logging (the determination of water and oil-bearing layers). It is also being used as a portable neutron source for discovery of metals such as gold or silver by on-the-spot activation analysis. It has been suggested that californium may be produced in certain stellar explosions, called supernovae, for the radioactive decay of ^{254}Cf (55-day half-life) agrees with the characteristics of the light curves of such explosions observed through telescopes. This suggestion, however, is questioned.