= Cadmium =

Cadmium is a chemical element with symbol Cd and atomic number 48 . This soft , bluish @-@ white metal is chemically similar to the two other stable metals in group 12 , zinc and mercury . Like zinc , it demonstrates oxidation state + 2 in most of its compounds , and like mercury , it has a lower melting point than other transition metals . Cadmium and its congeners are not always considered transition metals , in that they do not have partly filled d or f electron shells in the elemental or common oxidation states . The average concentration of cadmium in Earth 's crust is between 0 @.@ 1 and 0 @.@ 5 parts per million (ppm) . It was discovered in 1817 simultaneously by Stromeyer and Hermann , both in Germany , as an impurity in zinc carbonate .

Cadmium occurs as a minor component in most zinc ores and is a byproduct of zinc production . Cadmium was used for a long time as a corrosion @-@ resistant plating on steel , and cadmium compounds are used as red , orange and yellow pigments , to colour glass , and to stabilize plastic . Cadmium use is generally decreasing because it is toxic (it is specifically listed in the European Restriction of Hazardous Substances) and nickel @-@ cadmium batteries have been replaced with nickel @-@ metal hydride and lithium @-@ ion batteries . One of its few new uses is cadmium telluride solar panels .

Although cadmium has no known biological function in higher organisms , a cadmium @-@ dependent carbonic anhydrase has been found in marine diatoms .

= = Characteristics = =

= = = Physical properties = = =

Cadmium is a soft , malleable , ductile , bluish @-@ white divalent metal . It is similar in many respects to zinc but forms complex compounds . Unlike most other metals , cadmium is resistant to corrosion and is used as a protective plate on other metals . As a bulk metal , cadmium is insoluble in water and is not flammable ; however , in its powdered form it may burn and release toxic fumes .

= = = Chemical properties = = =

Although cadmium usually has an oxidation state of + 2 , it also exists in the + 1 state . Cadmium and its congeners are not always considered transition metals , in that they do not have partly filled d or f electron shells in the elemental or common oxidation states . Cadmium burns in air to form brown amorphous cadmium oxide (CdO) ; the crystalline form of this compound is a dark red which changes color when heated , similar to zinc oxide . Hydrochloric acid , sulfuric acid , and nitric acid dissolve cadmium by forming cadmium chloride (CdCl2) , cadmium sulfate (CdSO4) , or cadmium nitrate (Cd (NO3) 2) . The oxidation state + 1 can be produced by dissolving cadmium in a mixture of cadmium chloride and aluminium chloride , forming the Cd22 + cation , which is similar to the Hg22 + cation in mercury (I) chloride .

Cd + CdCl2 + 2 AlCl3 ? Cd2 (AlCl4) 2

The structures of many cadmium complexes with nucleobases , amino acids , and vitamins have been determined .

= = = Isotopes = = =