

5.3: Group 12 Metals

Sulfide ores of zinc, Zn, cadmium, and mercury, Hg, of Group 12 metals (Table 5.3.3) serve as raw materials in metallurgy. These metals are located immediately after the transition metals in the periodic table but they do not behave like transition metals because their d orbitals are filled, and zinc and cadmium exhibit properties intermediate between hard and soft reactivities of magnesium. Mercury is soft and a liquid and it tends to bond to phosphorus or sulfur ligands. Mercury forms monovalent and divalent compounds but monovalent mercury is actually Hg^{2+} . This is a cationic species which has a Hg-Hg bond, and mercury further catenates to give, for example, $\text{Hg}_4(\text{AsF}_6)_2$.

Table 5.3.3 Properties of group 12 metals

	mp (°C)	bp (°C)	d(25 °C) (g cm ⁻³)	E ⁰ (V) M ²⁺ +2e ⁻	I first	(kJ mol ⁻¹) second	third
Zn	420	907	7.14	-0.76	906	1733	3831
Cd	321	767	8.65	-0.40	877	1631	3644
Hg	-38.8	357	13.5	0.85	1007	1809	3300

Cadmium and mercury are poisonous, especially organic cadmium and organic mercury compounds are deadly poisons and should be handled carefully.

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