Group VIB; Chromium Group

Basics

- Chromium (Cr), molybdenunm (Mo) and tungsten (W) are rather important elements .
  - Chromium is the key ingredient for stainles steels; it is also indispensable for many other prodcuts and applications. A few million tons are produced every year; no more needs to be said.
  - Molybdenunm (Mo) and tungsten (W) have very high metling points asn are thus indispensable for high temperature applications (e.g. the tungsten filament in your light bulb). Both are used as alloying element in steel (and in other alloys).
    You very likely have Molybdenum silicide ($MoSi_2$) in you household, It is usually the heating element in dishwashers or washing machines since it has the right specific resistivity and, most important, does not corrode in these extremely harsh environments.

- *Table of Basic Data*

Name *(German)*	**Chrom** *Chromium*	**Molybdän** *Molbdenum*	**Wolfram** *Tungsten*
Atomic number	24	42	74
Atomic mass [u]	51,9961	95,94	183,85
Melting point [K]	2130	2890	3680
Melting point [^oC]	1857	2617	3407
Melting point [^oF]	3375	4742	6165
Boiling point [K]	2755	5833	6200
Density [g/cm^3]	7,14	10,28	19,26
Ionization energy [eV]	6,766	7,099	7,98
Electro-negativitiy	1,6	1,3	1,4
Atomic radius [pm]	124,9	136,2	137,0
Ionic radius [pm]	64	62	62
Oxidation numbers	6 to -2	6 to -2	6 to -2
Lattice typ **Transformation temp. [^oC]**	bcc -	bcc -	bcc -
Lattice constant [Å] **(a or c)**	2,89	3,15	3,16
Young's - Modul us [GPa]	186	301	388
Therm. expansion coefficient α **[$10^{-6}K^{-1}$]**	?	6,5	7,0

- In case of doubt all numbers are for room temperatures
- fcc = face centered cubic; lattice const. = a
  bcc = body centered cubic
  sc = simple cubic
  hp = simple hexagonal
  hcp = hexagonal close packed; lattice constants a and c.
  op = simple orthorhombic, monoclinic, triclinic
  tp = simple tetragonal
  dia = diamond structure
  r = trigonal or rhomboedral trigonal