

Problem set 1

1. Sketch the long form of the periodic table where the Group 3 metals are (a) Lu and Lr and (b) La and Ac. Which makes most chemical sense?
2. Look up the ground states of the actinide elements and Lr. On this evidence, is the argument that Lr is the Group 3 metal rather than Ac as strong as the argument for Lu vs. La?
3. Examine the figure showing the metallic radii of the d-block elements. Where on this plot would the radii of the 6d metals be expected to lie?
4. Give plausible alternative names for (a) the octahedron, (b) the tricapped trigonal prism, (c) the bicapped square antiprism, and (d) the icosahedron.
5. Some other common high coordination number geometries that did not appear in the Group 3 handout include capped trigonal prism (7), capped octahedron (7) and bicapped trigonal prism (8). Draw these.
6. The makers of superconducting magnets face a basic difficulty which Lindenfeld has put succinctly: "magnetism and superconductivity are natural enemies". By considering the differing requirements of magnetism and superconductivity with respect to electron spin, explain this statement.