

41. Ionisation enthalpies of Ce, Pr and Nd are higher than Th, Pa and U. Why?
42. Although Zr belongs to 4d and Hf belongs to 5d transition series but it is quite difficult to separate them. Why?
43. Although +3 oxidation states is the characteristic oxidation state of lanthanoids but cerium shows +4 oxidation state also. Why?

41. **Hint :** It is because in the beginning, when 5f orbitals begin to be occupied, they will penetrate less into the inner core of electrons. The 5f electrons will therefore, be more effectively shielded from the nuclear charge than 4f electrons of the corresponding lanthanoids. Therefore outer electrons are less firmly held and they are available for bonding in the actinoids.
42. **Hint :** Due to lanthanoid contraction, they have almost same size (Zr, 160 pm) and (Hf, 159 pm).
43. It is because after losing one more electron Ce acquires stable $4f^0$ electronic configuration.