Selectivity for Cryptands.

- Better selectivity than crown ethers - stability constants peak where cation size matches cavity size.
- More rigid cavity → less conformational flexibility
- Pre-organisation of binding sites.

(b) - Spherands: Pre-organised receptor sites
- 6 O-donor atoms arranged in rigid octahedral cavity.
- High binding constants to Li^+ and Na^+.
- No unfavourable energy terms from ligand upon binding.
- K^+ not bound → cavity too small.

3. Selectivity via Choice of Ligand Donor Atoms.

- Replacement of Oxygen (hard donor) with Nitrogen (softer donor) increases preference for soft metal ions (Ag^+).
- Other factors important for Transition Metal Ions - e.g. Irving Williams series.

4. Selectivity by Directionality of Bonding.

Ion-Dipole Interactions; Key to metal-ligand bonding, are not strongly directional.

Hydrogen Bonding; strongly directional - most effective with linear arrangement between H-bond donor and H-bond acceptor.

BONDING OF $[RNH_3]^+$ TO CROWN ETHERS

- Crown ethers can bind to ammonium $[NH_4]^+$ and alkylammonium $[RNH_3]^+$.
- Ion-dipole interactions can be reinforced by H-bonding but symmetry of crown ether important.