Nickel vs. Cobalt Columns

Both nickel and cobalt have six metal coordination sites each, but nickel has higher affinity for polyhistidine tags (usually), especially at lower concentrations or when the tags are not fully exposed. Though cobalt's weaker affinity can mean lower yield, it isn't necessarily a bad thing because it also generally means that fewer contaminating proteins will be present after elution, plus the elution process is "gentler" on the protein. But I think what it comes down to these days is really the company you buy the resin from. The cobalt-nickel battle line is drawn between BD and Qiagen: BD insists that their absurdly named TALON system (which uses the HAT tag, a more "natural" version of the 6xHis tag) is faster and produces higher yields than Qiagen's Ni-NTA products, and Qiagen claims the reverse. Aside from the mildly different tags and ions, the two systems are essentially the same, and their improved (over older IDA IMAC) yields both are probably the result of the chelating ligands in the resins (NTA for Ni-NTA and "TALON resin" for TALON), both of which occupy four of the six Ni^{2+} or Co^{2+} coordination sites to tighten binding and prevent excess metal from leaching out of the matrix during elution.

A lot of it is just personal preference, but if you really want to know if one ion is better for purifying a protein than another, Vivascience makes "Vivapure" microcentrifuge spin columns that cost about four bucks each and come preloaded with either nickel, cobalt, copper, or zinc ions immobilized in a special membrane--from start to finish, purification takes 30 minutes (or so they say) and then you can run a gel to see which one is most effective. It seems like a very clever little system (though the ligand might not be as sophisticated as the larger scale kits).

Damien Soghoian, July 2004