

14.13: Effects on Basicity (Attraction for Proton)

All of the factors that we have discussed for Brønsted acidity, or the ability of a compound to provide a proton to its surroundings, have an effect on basicity as well. In other words, factors like nuclear charge / electron affinity influence how strongly a compound will attract or bind a proton.

In summary:

- the higher the electron affinity or core charge of an atom, the less likely it is to donate its electrons to a proton.
- the greater the delocalization of electrons that could potentially donate to a proton, the less able they are to donate.
- the greater the electron-withdrawing effects in another part of a molecule, the less likely the electrons on a particular atom are to donate.

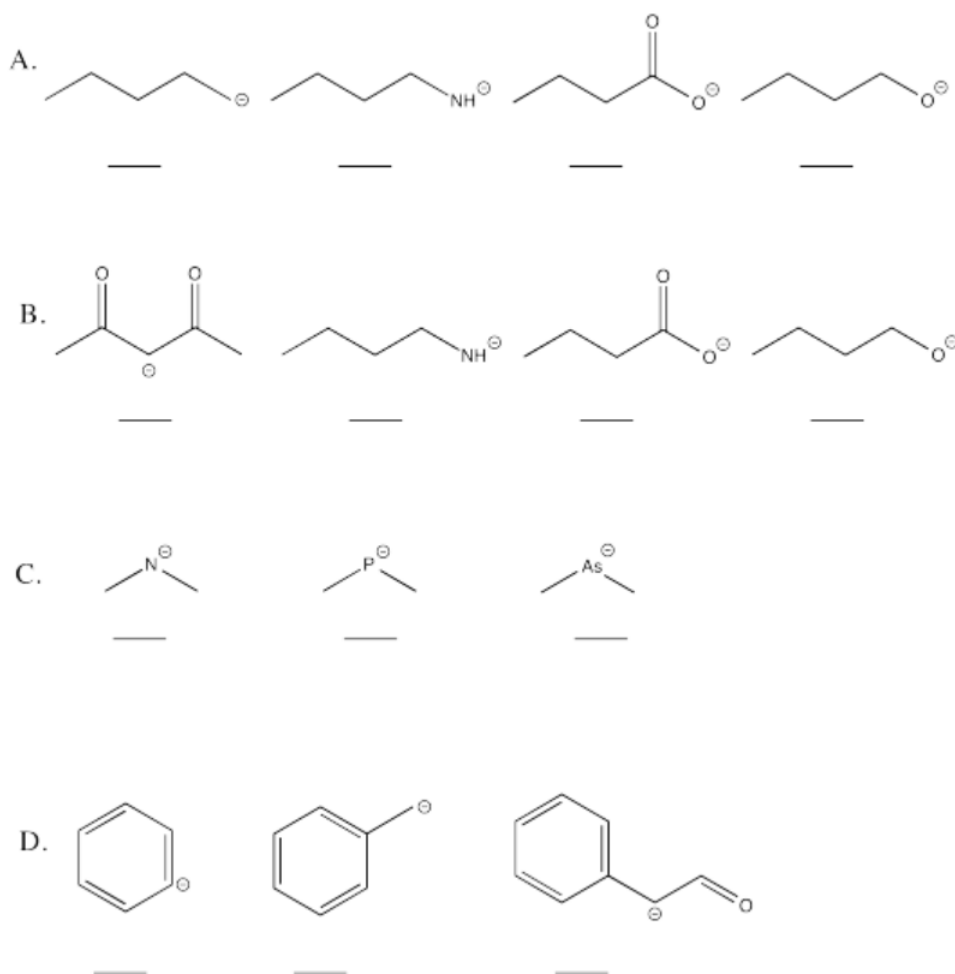
These factors are generally complementary to the effects on acidity. A factor that makes a Brønsted acid **more acidic** usually makes the corresponding conjugate base **less basic**.

However, sometimes things can be more subtle.

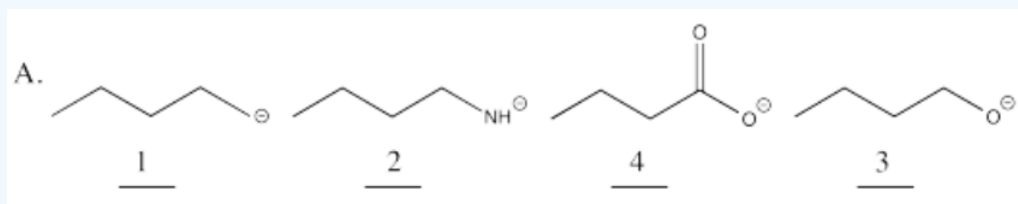
- the higher the polarizability of an atom (i.e. the larger an atom), the more easily it can donate to a Lewis acid (its electrons are not held very tightly because they are far from the nucleus, and so they can be donated easily).
- except: a larger atom cannot donate easily to a proton. In this specific case, the Lewis acid (the proton) is too small to get good covalent overlap with the Lewis base, so it can't form a very strong bond

Exercise 14.13.1

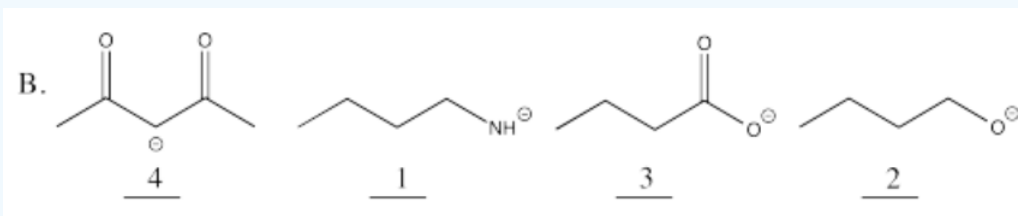
Rank the following in terms of base strength (1 = strongest base).



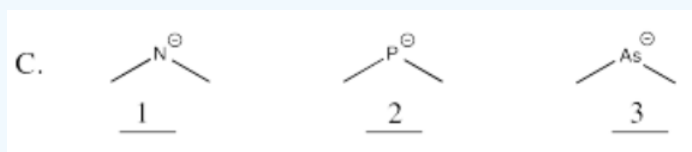
Answer a



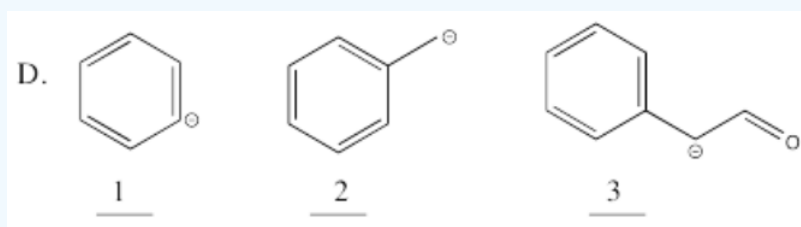
Answer b



Answer c



Answer d



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