A brief guide to cold (neutral) molecule formation methods…

- Assemble ultracold atoms:
  - Photoassociation
  - Magnetoassociation

T<<1mK

- Create stable molecules in (a single) excited level
- Transfer to the absolute ground state: adiabatic transfer (STIRAP), shaped laser pulses,…

OR

- Slow down preformed molecules with external time varying electric or magnetic fields through their intrinsic dipole moments, or via collisions with a buffer gas

T>1mK

OR

- Let atoms stick together on/in helium nanodroplets

T~1K

OR

- Laser-cool species with suitable properties (SrF, YO,…)

T~1mK

OR

…

See recent review articles: Carr, DeMille, Krems, Ye, New J. Phys. **11**, 055049 (2009), Dulieu & Gabbanini Rep. Prog. Phys. **72**, 086401 (2009)
See recent special issues: PCCP **13**, 18703 (2011); Chemical Review **112**, 4801(2012)