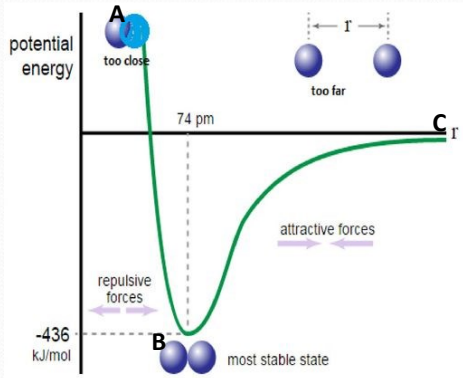
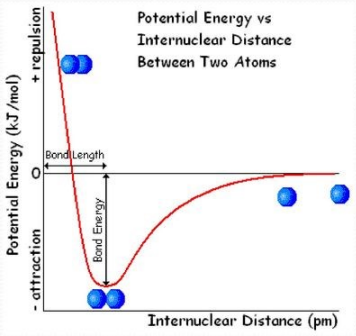
Plotting potential energy vs. bond length

- Typical plot of potential energy vs. bond length appears as follows
  - Ex: Hydrogen, H2
    bond length: 74 pm
    bond strength: 436 kJ/mol
- Since forces of attraction stabilize atoms, the greater the number of electrons involved, the stronger the attraction
  - Result: triple bonds tend to be stronger than double bonds, and double bonds are stronger than single bonds
  - Shorter bonds also tend to be stronger than longer bonds



Practice

- Assume that the potential energy vs. bond length plot represents Oxygen, draw a curve representing Nitrogen.



Questions refer to the top diagram at the right.

1. The minimum energy occurs at point ____ , At this point , the distance between the H atoms is equal to the _____.
2. When do the H atoms have higher energies than the H_2 molecule?
3. Going from point b to point a, the energy is inc/dec because of the inc/dec in attractive/repulsive forces.
4. Going from point b to point c, the energy is inc/dec because of the inc/dec in attractive/repulsive forces.
5. What causes the change in energy from point c to point b?
6. What causes the change in energy from point b to point a?
7. At point b, the attractions and repulsions are _____- . The energy required to separate the atoms is called _____ .
8. A covalent bod results from the sharing or _____ between atoms.
9. Potential energies resulting form attractive forces are always postivie/ negative .
10. What is meant by "zero" potential energy between two hydrogen atoms? *Where on the diagram will this be found?*

For the practice draw the electron dot structure for O_2 and N_2 to help determine your answer.