Quiz 18.2 – Reaction Dynamics

Name: Key

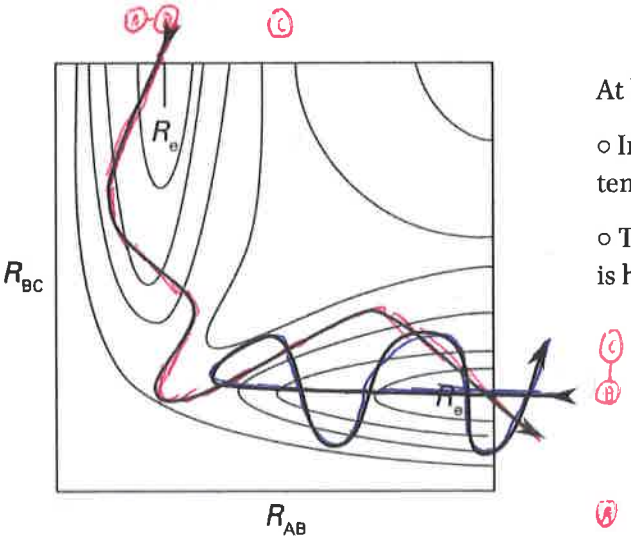
Molecular Beam Experiments

List the three factors which determine the scattering angle of a molecular beam.

1. Velocity — Controlled
2. impact parameter (b) — independent variable
3. inter molecular forces — goal of experiment

One of these factors is controlled in an experiment, one is the independent experimental variable, and determining one of them is often the goal of an experiment. Indicate which is which.

Reactions and Potential Surfaces



At left is a modified version of Figure 18D.12 from out textbook.

- In the two limits marked R_e, draw the atomic configuration of the system. Label the H atoms A, B, and C.
- Two different trajectories are marked, in blue and red. Describe what is happening on the microscopic level in each of the trajectories

red: C approaches a vibrating A-B molecule. Reaction is successful, leaving a vibrating B-C molecule and ejecting A

blue: A approaches non-vibrating B-C molecule. No reaction occurs. A rebounds, exciting the B-C vibration

Electron Transfer

At right is a digram similar to figure 18E.1 from our textbook, showing three different regimes for electron transfer.

A - Which diagram represents a system where electron transfer occurs at the stretched phase of a vibration?

C - Which diagram represents a system where electron transfer occurs at the compressed phase of a vibration?

B - Which diagram represents a system where electron transfer occurs most rapidly in the vibrational ground state?

C - Which system will be most vibrationally activated after electron transfer?