

Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Formation of ultracold molecules in chemical reactions TIMUR TSCHERBUL, Department of Chemistry, University of British Columbia, Vancouver, B.C. V6T 1Z1, Canada, GIRTS BARINOV, Department of Theoretical Physics, Institute of Chemical Physics, University of Latvia, Riga, Latvia, JACEK KLOS, Department of Chemistry and Biochemistry, University of Maryland, College Park, MD 20742, ROMAN KREMS, Department of Chemistry, University of British Columbia, Vancouver, B.C. V6T 1Z1, Canada — We demonstrate that chemical reactions in collisions of high-energy molecular beams can generally produce molecules with zero velocity in the laboratory-fixed frame. Our analysis shows that collisions of beams may simultaneously yield slow reactant molecules and slow products. The reaction products are formed in selected ro-vibrational states and scattered in a specific direction, which can be controlled by tuning the kinetic energies of the incident beams and the angle between the beams. We suggest that chemical reactions involving alkali metal dimers may be particularly suitable for producing slow molecules in crossed beams. Our calculations show that chemical reactions of polar alkali metal dimers are barrierless.

Timur Tscherbul
Department of Chemistry, University of British Columbia,
Vancouver, B.C. V6T 1Z1, Canada

Date submitted: 01 Feb 2008

Electronic form version 1.4