(12.7) What is the maximum velocity that a deuteron of 2 MeV can impart to a ^{16}O atom?

Constants, units, and known values:

$MeV := 1.60217733 \cdot 10^{-13} \cdot joule$ $\quad N_A := 6.022 \cdot 10^{23} \cdot mole^{-1}$ $\quad c := 299792458 \cdot \frac{m}{sec}$

$M_d := 2 \cdot gm \cdot mole^{-1}$ $\quad M_{O16} := 16 \cdot gm \cdot mole^{-1}$

Given in the text:

$E_d := 2 \cdot MeV$

Calculations assuming non-relativistic behaviour:

$E_O := \frac{M_d \cdot M_{O16}}{\left(M_d + M_{O16}\right)^2} \cdot E_d$ $\quad E_O = 3.165 \cdot 10^{-14} \cdot kg \cdot m^2 \cdot sec^{-2}$ $\quad E_O = 0.198 \cdot MeV$

$v_{max} := \sqrt{\frac{2 \cdot E_O}{\left(\frac{M_{O16}}{N_A}\right)}}$ Classical mechanics $\quad v_{max} = 1.543 \cdot 10^6 \cdot m \cdot sec^{-1}$

$2 \cdot v_{max} = 3.09 \cdot 10^6 \cdot m \cdot sec^{-1}$

Check non-relativistic assumption: $\frac{v_{max}}{c} = 0.515 \cdot \%$