

Infrared studies of CO₂ doped Xe solutions in gas, liquid and solid phases. The fundamental ν_3 band and the Coriolis perturbed Fermi doublet ($\nu_1 + \nu_2^{11}$, $\nu_1 + \nu_2^{12}$).

Autorzy

K. S. Rutkowski
S. M. Melikova
T. D. Kolomiitsova
N. N. Filippov
Aleksander Koll

Rok wydania

2001

Czasopismo

Journal of Molecular
Structure

Numer woluminu

596

Strony

179-183

DOI

10.1016/S0022-
2860(01)00711-6

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

The IR absorption spectra of CO₂ doped Xe solutions have been recorded in the range of the fundamental $\nu_3(\Sigma_u)$ band and of the Coriolis perturbed $\nu_1 + \nu_2^{11}$, $\nu_1 + \nu_2^{12}(\pi_u)$ Fermi doublet ($\nu_1 + \nu_2 \approx 3\nu_2$) in gas, liquid and solid phases. The characteristic transformation and rapid narrowing of the ν_3 band, observed in the gas to liquid phase transition, shows marked hindering of the rotational motion of the CO₂ molecule in dense Xe mixtures. It was found that the liquid to solid phase transition is accompanied by noticeable broadening of the ν_3 band. The rotational motion of CO₂ is not frozen in solid Xe at least near the freezing point. This is in contrast with sharp narrowing of the vibrational bands and so with blocking up rotations in the case of a heavier CS₂ guest in the solid Xe host just below the freezing point. The intensity ratio $A(\nu_1 + \nu_2^{11})/A(\nu_1 + \nu_2^{12})$ of the Coriolis perturbed $\nu_1 + \nu_2^{11}$, $\nu_1 + \nu_2^{12}$ doublet reveals the noticeable increase from 8 ± 1 in a low density gas to 18 ± 2 in the liquid phase. The results obtained suggest remarkable modification of the second-order Coriolis coupling in the case of CO₂ doped dense liquid Xe.

Słowa kluczowe

Vibrational spectra, CO₂, Noble gas solutions, Phase transition, Rotational relaxation processes, Coriolis coupling

Adres publiczny

[https://doi.org/10.1016/S0022-2860\(01\)00711-6](https://doi.org/10.1016/S0022-2860(01)00711-6)

Strona internetowa wydawcy

<http://www.elsevier.com>