Carbon monoxide is the second most abundant molecule in the universe after molecular hydrogen, and is present in wide variety of astrophysical environments. Therefore, the importance of the investigations of CO+ ion for the knowledge of physical and chemical processes taking place in the atmospheres of planets. However, singly charged carbon monoxide has been less observed in those environments.

Collision-induced dissociation (CID) can be used to study different fundamentals aspects. CID has been a widely used ion-molecule collision technique for structure determination and fragment pathway analysis, has also been useful in identifying the electronic states of the dissociation products, as well as to measure cross section of dissociation process (1-2).

Calculations of the potential energy surfaces of the ground and excited electronic states of CO and its single charged ion have been carried out by many researchers with varying degrees of success [3]. These calculations allow us to interpret our results about KER.

In this work we have measured the kinetic energy distributions of C+ and O+ fragments arising from 6 keV collision-induced dissociation of CO+ ions with helium and we have determined the kinetic energy release (KER) in both processes of dissociation.

The measurement of the fragment laboratory kinetic energy distribution enables us to determine the energies W of the predissociative or dissociative states reached during the collision with respect to their associated dissociation limit and therefore gives information on the mechanism of dissociation. Because of the accurate angular discrimination of parent and fragment ions; C+ or O+, the excess energy W released in the c.m. at energy collision 6 keV. The collisional dissociation process gives rise to fragments with KER as large as 9.91 eV. Some peaks are in agreement with the works of Caraby et al. [3]. In addition, we have observed KER corresponding to transitions since different vibrational excited states in the electronic ground state. Figure 2b shows centre-of-mass energy distribution of O+ at 6 keV of projectile energy. The experimental spectrum is presented with a gaussian fit, where is possible to observe the KER value corresponding to the different initial and final states in the dissociation process. We measured for first time KER value for dissociation of CO+ through C + O+ channel. It is not possible to do comparison because this channel has not been studied deeply.

REFERENCES

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