**Raman shift of water**

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**Abstract: -**

Raman spectra from sodium halides and clean water solutions are found off the OH elongating (2500–4000 cm-1) Five Gaussian constituents of the Raman outlines are deconvoluted whose middle frequencies are 3628, 3051, 3511, 3393, and 3233cm-1. The resemblances and variances of the properties of sodium halides and temperature on the structure of hydrogen bond water are exposed plainly by the Raman spectra and by its deconvolutions. Alike temperature, the whole of the sodium halides breakdown the tetrahedral structure of the water, and the Gaussian factor of 3233 cm-1 reductions, and the factor of 3393 and 3511 cm-1 rise mostly. The variances remain in their properties on the factor 3628 and 3051 cm-1. The tetrahedral structure of water is disrupted by all of the halogenic ions and their disrupting activities are in the increasing order of F-1 < Cl-1 < Br-1 < I-1. The motive is relative to the strong point of water-water hydrogen and halogenic ion–water bonds.

**Introduction: -**

The maximum abundant, Water, and typical fluid on the earth, it has several unique properties that act an important role in chemical and biological reactions. All of the rare properties associated with water structure, which have been analyzed in theory and tested broadly [1]. Though, aspects of water structure remain undefined. Liquid water seems to keep tetrahedral hydrogen-bonded structures similar to the structure of ice. Ions and temperature are two normal factors that affect the water structure. Usually, the water structure is cracked with rising temperatures. Ions may have parallel worrying results to the temperature on water structure, and even the idea of ‘structure temperature’, which describes the temperature at which clean water would have the identical properties as those of a certain solution, was used [2]. The ion’s effect on the structure of water is ion-specific. Halogenic ions have performed a significant part in opening out the properties of anions on the structure of water [3]. It is essential to study the connections of halogenic ions and water molecules and to express separately their properties on water structure in the description.

We will discuss the Raman spectra related to all these things.

**Result and Discussion: -**

Raman spectrum Temperature dependence of pure water: -

It has been shown in the figure, the OH extends (2500–4000 cm-1). The temperature range of Raman spectra of pure water is 273–373 K. It can be viewed from the Raman spectra of water that the maximum peak happens near 3420 cm-1, a strong shoulder happens near 3230 cm-1, and a weak shoulder is apparent near 3620 cm-1. With the increase in temperature, the location of the highest peak changes to high wavenumber, and the strength of the strong shoulder reductions and the weak shoulder growths. The frequency of the elongate OH vibrations is the consequence of shared effects, and an alteration of the temperature will result in spectral shifts of the dissimilar kinds of water molecules. Though the Raman spectra do not shift considerably more in the temperature choice of 273–373 K, and the stretching of OH Gaussian constituent central frequencies are comparatively self-determining of temperature [4]. It is sensible to decay the spectrum of the stretch of OH sensations with the five Gaussians of the water molecule that are allocated to specific kinds of water molecules, and the dominant frequencies remain the same in this study. It has been shown in fig 2 deconvolution of the Raman spectrum of unpolluted water at 273 K and the Raman spectra of unpolluted water at further temperatures are deconvoluted in a similar way. In Fig 3 expressions the percent of the combined strength of each constituent in the whole combined intensity of the spectrum as a purpose of temperature.

From Fig. 3, concentrations of the constituents of 3051 and 3233 cm-1 reduce, and the concentration of constituents of 3393, 3511, and 3628 cm-1 rises with growing temperature. Typically, tetrahedral structures of water disruption and somewhat hydrogen-bondedstructures of water are improved with rising temperatures. It might be realized that the constituents of 3051 and 3233 cm-1 are owed to an entirely four-hydrogen involved water structure. The previous is maybe owed to intermolecularly combined ν1 vibrations everchanging in point with one another and the latter is owed to the communal in phase O–H lengthening vibrations of hydrogen-bonded collections comprising a leading water molecule and its head-to-head and developed neighbours [5]. Constitution of 3511, 3393, and 3628 cm-1 could be assigned to partly hydrogen-bonded water arrangement. There is a difference with further studies in the task of the constituent of 3393 cm-1. Typically, constituent near 3400 cm-1 such as component 3415 or 3393cm-1 is assigned to a fully four-hydrogen bonded water structure [1,6].The totaling of ions has similar properties on the Raman spectrum of water to the alteration of temperature.

100

Relative intensites

80

60

343

373

40

20

3900

3300

2500

Raman shift cm-1

FIG 1

Many further kinds of research disintegrated the OH elasticity Raman spectra of pure water with Gaussians, and its dominant frequencies remain the same in perusing the effects of particles on water structure [6].In the subsequent study, the Raman spectra of water with the totaling of sodium halide are too deconvoluted in the identical way.

2700

3300

3900

Relative intensity

Raman Shift cm-1

Fig 2: Raman spectra of water and its five Gaussian fits.

Fig: 3 description

3511

3051

3233

3628

3393

50

10

C of component%

C of component%

5

25

380

330

270

0

025

Temperature K

Fig 3

**Conclusion: -**

For five constituent Gaussian deconvolution of Raman spectra of pure water, factor 3233 and 3051 cm-1 can been allocated to completely 4 hydrogen bonded water molecules, factor 3511 and 3393 cm-1 to somewhat hydrogen bonded water molecules, and factor 3628 cm-1 to permitted water molecules or permitted OH. The resemblances and changes exist amongst the properties of the sodium halides and temperature on arrangement of water. Equally sodium halides and temperature break tetrahedral structure of water and conduce constituent of 3233 cm-1 reductions and constituent of 3511 and 3393 cm-1 growth essentially. The changes of them remain in changes of constituent 3628 and 3051cm-1.

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