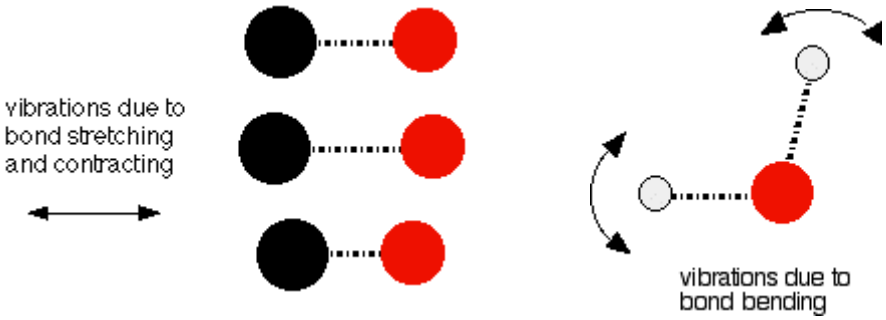
INFRA-RED SPECTROSCOPY: INTRODUCTION

1. a) Covalent bonds are constantly stretching and contracting, or bending:



If a bond can absorb the right amount of energy, it moves into a higher state of vibration. The right amount of energy can be found in certain frequencies of infra-red light. If that energy is taken up by the molecule, then obviously that frequency is being removed from the light.

b) The way the bond vibrates depends on the length of the bond and what is attached at each end of it. All of these molecules have different covalent bonds: H-O, C=O and C-H. In each case, the amount of energy needed to move them into a higher state of vibration will be different. That means that they will each absorb infra-red radiation of a different frequency.

2. a) Varying frequencies of infra-red light are passed one at a time through a sample of the substance, and the amount of light passing through the sample is measured for each frequency.

b) This is a measure of the amount of the light passing through the substance and being detected at the other side. 100% transmittance means that none of that frequency was absorbed. 0% transmittance would mean that all of that frequency was absorbed.

c) The frequency of the light.

d) Troughs show where there has been a significant amount of light of that frequency absorbed.