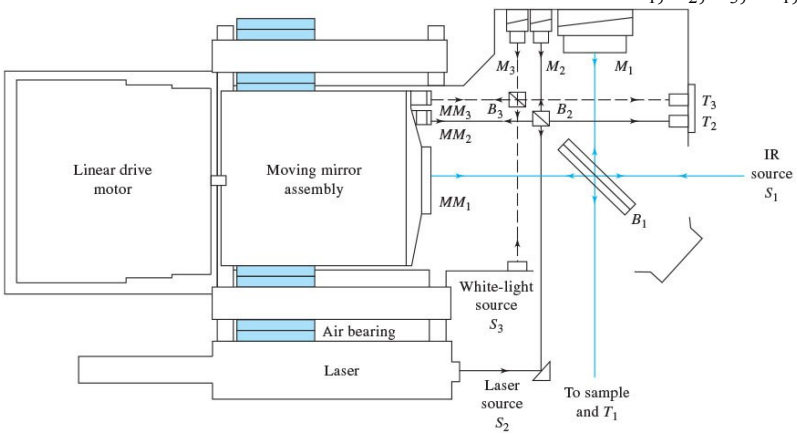
Name: _____ ID: _____

Analytical Chemistry II – Quiz (19th April, 2022)

1) What factors can potentially reduce the number of observed IR absorption bands?

- Symmetry of the molecules (no change in dipole moment)
- Energies of two or more vibrations are (almost) identical
- Absorption intensity is too low
- Absorption wavelength is beyond the range of the instrument

2) The drawing shows interferometer system of a modern FTIR instrument. Explain the principle of its operation. Mention the functions of the elements labeled as S_1, S_2, S_3, M_1, M_2, M_3, MM_1, MM_2, MM_3, B_1, B_2, B_3.



This FTIR instrument takes advantage of three Michelson interferometers to record three interferograms. During its operation, the moving mirror assembly is moved. The beam from S_1 is split in B_1, reflected from fixed mirror M_1 and movable mirror MM_1, and the merged beams undergo interference between B_1 and sample. This way, IR interferogram is created, which can later be converted to IR spectrum. S_2, B_2, M_2, and MM_2 are used to produce laser-fringe signal, to know the exact position of the moving mirror assembly. S_3, B_3, M_3, and MM_3 are used to record white light interferogram, to know the position of the moving mirror assembly that corresponds to zero retardation.

S_1 – IR source used for recording IR interferogram/spectrum of the sample

S_2 – laser source used to record laser-fringe signal, to know the exact position of the moving mirror assembly

S_3 – white light source used to record white light interferogram, to know the position of the moving mirror assembly that corresponds to zero retardation

M_1 – fixed mirror used for recording IR interferogram/spectrum of the sample

M_2 – fixed mirror used to record laser-fringe signal, to know the exact position of the moving mirror assembly

M_3 – fixed mirror used to record white light interferogram, to know the position of the moving mirror assembly that corresponds to zero retardation

MM_1 – movable mirror used for recording IR interferogram/spectrum of the sample

MM_2 – movable mirror used to record laser-fringe signal, to know the exact position of the moving mirror assembly

MM_3 – movable mirror used to record white light interferogram, to know the position of the moving mirror assembly that corresponds to zero retardation

B_1 – beamsplitter used for recording IR interferogram/spectrum of the sample

B_2 – beamsplitter used to record laser-fringe signal, to know the exact position of the moving mirror assembly

B_3 – beamsplitter used to record white light interferogram, to know the position of the moving mirror assembly that corresponds to zero retardation