Synchrotron-based infrared Microspectroscopy at NSRRC (TLS BL14)

Std. No.:

Name:

Exercise

1. Which of the optical components of the Michaelson interferometer.
   (A) Beam Splitter (B) IR source (C) Fixed and Moving mirror (D) Above all.

Answer:

2. Calculate the displacement for the moving mirror in an FTIR spectrometer to resolve the 4.0 cm^{-1} difference between two adjacent peaks?
   (A) 0.625 cm (B) 0.125 cm (C) 0.25 cm (D) 0.5 cm

Answer:

3. Calculate the frequency range of a modulated signal from a Michaelson interferometer with a mirror velocity of 0.2 cm/s for infrared radiation of 25 μm?
   (A) 1.6 kHz (B) 160 Hz (C) 16 Hz (D) 1.6 Hz

Answer:

4. Which of the working principle of wax physisorption kinetics?
   (A) Chemical Similarity (B) Glycan adsorbent (C) Desorption (D) above all.

Answer:

5. What is the major concern about the vibrational transition in a molecule?
   (A) Covalent Bond (B) Electric field (C) Polarizability (D) Dipole moment of periodical change.

Answer:

6. Following ATR crystals, which has the lowest penetration depth for a sample?
   (A) Diamond (B) Germanium (C) Zinc Selenide (D) Silicon

Answer:

7. What is the wave number difference of optical retardation for two wavefronts required in the Michaelson interferometer to resolve two adjacent absorption peaks?
   (A) 1 (B) 2 (C) 0 (D) 0.5

Answer:

8. The optical purpose for the design of a dual aperture in a confocal infrared microscope, which explains is right?
(A) Upper aperture defines the beam size and shape.
(B) Lower aperture to filter higher-order diffraction.
(C) Dual aperture affecting the resolution
(D) Above all.
Answer:

9. Calculate the diffraction-limit wavele for the incident radiation in the reflection measurement of confocal FT-IR microscopy and the numerical aperture (N.A.) for IR objective and the diameter of confocal aperture is 0.65 and 5.0 μm, respectively.
(A) 2.6 (B) 5.3 (C) 0.05 (D) 1.22 μm
Answer:

10. Which functional group is as follows with characteristic absorption at 1730 cm^{-1}, indicating the presence of a (A) C=O (B) O-H (C) N-H (D) C≡N.
Answer: