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NPTEL

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Unit 8 - Week 7

Register for Certification exam

Course outline

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- Line Radiation
- Spectral Modelling
- Wide Band Models
- WSGG Model
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- Quiz : Assignment 7
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Week 8

Assignment 7

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-03-20, 23:59 IST

1) In a real radiation spectrum the emission and absorption lines tend to overlap with each other due to ***1 point***

- Vibrational transition
- Electronic transitions
- Presence of spectral lines of various gases
- Line broadening

No, the answer is incorrect.
Score: 0

Accepted Answers:
Line broadening

2) The Doppler broadening mechanism dominates over other broadening mechanisms under ***1 point***

- Low pressure and high temperature
- High pressure and low temperature
- Low temperature in infrared
- High pressure in infrared

No, the answer is incorrect.
Score: 0

Accepted Answers:
Low pressure and high temperature

3) A certain gas at 1 bar pressure has a molecular mass of m = 10^{-22} g and a diameter of D = 5×10^{-8} cm. At what temperature would Doppler and collision broadening result in identical broadening widths for a line at a wavenumber of 4000 cm^{-1} ***1 point***

- 3000 K
- 6710 K

4340 K

4) If in O_2 the Doppler half width for a spectral line at 1000 cm^{-1} is measured to be 0.002 cm^{-1}, ***1 point*** then the approximate temperature of the gas is

- 800 K
- 500 K
- 1000 K
- 2000 K

No, the answer is incorrect.
Score: 0

Accepted Answers:
1000 K

5) If the pressure of a certain gas is increased to two times keeping all other parameters same, its collision half width will ***1 po***

- Increase by two times
- Decrease by two times
- Does not depend on pressure
- Increase by four times

No, the answer is incorrect.
Score: 0

Accepted Answers:
Increase by two times

6) For a certain gas sample the spectrally averaged emissivity of a narrow band with 1.0 m path length is found to be 0.9. Assuming the absorption lines are weak, uniformly spaced (d = 0.001 μm) and are of uniform strength. The line strength is ***1 point***

- 2.302 x 10^{-8} m
- 1.435 x 10^{-9} m
- 2.302 x 10^{-9} m
- 1.435 x 10^{-8} m

No, the answer is incorrect.
Score: 0

Accepted Answers:
2.302 x 10^{-9} m

7) The narrow band emissivity of a certain gas sample with 1.0 m path length is calculated with the Malkmus and Goody model. Assuming τ=0.5 and β=0.5, the difference between the emissivity as calculated with the two models is ***1 point***

- 0.001
- 0.053
- 0.010
- 0.031

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.031

8) For a fictitious gas the cumulative narrow-band k-distribution varies linearly as k = 0.2g + 0.05 cm^{-1}, the transmissivity of 1 cm column of this fictitious gas is ***1 point***

- 0.9999
- 0.8621
- 0.9417
- 0.0232

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.8621

9) The concentration of water vapor in an air-water vapor mixture (at 3 atm, 600 K) contained ***1 po***
in an isothermal 10 cm cube test section is to be determined experimentally by measuring the total band absorptance of its 6.3 μm band. If the total band absorptance was found to b 0.964, the volume fraction of water-vapor in the test section is (use exponential **wide band model**):
Assume overlap parameter β = 0.211, Band strength α = 41.2 $cm^{-1}/(g/m^2)$ and correction parameter ω= 56.4 cm^{-1}

- 0.1 %
- 2 %
- 10 %
- 1 %

No, the answer is incorrect.
Score: 0

Accepted Answers:
2 %

10) Calculate the emissivity of a 1 m thick gas layer using the weighted-sum-of-gray-gases (WSGG) model: ***1 point***
Assume the following values of coefficients for the mixture,
α_0=0.466, α_1=0.337, α_2=0.159, α_3=0.038
κ_0=0, κ_1=0.267 m^{-1}, κ_2=4.65 m^{-1}, κ_3=71.7 m^{-1}

- 0.2838
- 0.7498
- 0.3291
- 0.2744

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.2744

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