

MAKE-UP G-1 GROUP ASSIGNMENT: UNDERSTANDING RADIATION, ABSORPTION & WAVELENGTHS OF THE ELECTROMAGNETIC SPECTRUM (worth 10 pts)

Your SIGNATURE:

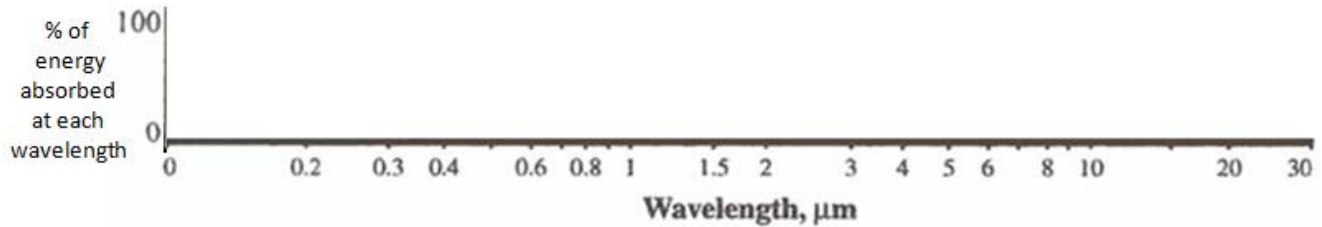
PRINT YOUR NAME legibly next to the signature:

BACKGROUND (Radiation Law #6):

ABSORPTION CURVES (diagrams that show *which* wavelengths of energy different gases selectively absorb)

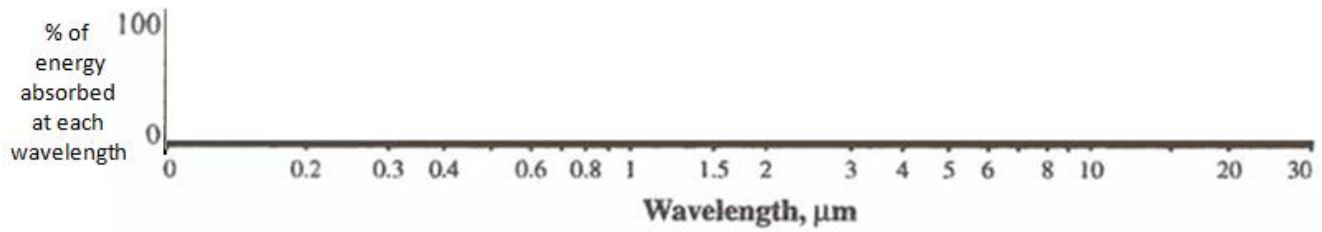
We use an **absorption curve** (graph) to show the relationship between **wavelengths** of the electromagnetic spectrum (along the horizontal axis) and the **% of energy at each wavelength** that is absorbed by a particular gas (vertical axis)

Q1. Draw an absorption curve for a hypothetical gas that can absorb ALL UV radiation but zero visible light and IR radiation. Then **shade in the area under your curve** in this and subsequent questions.



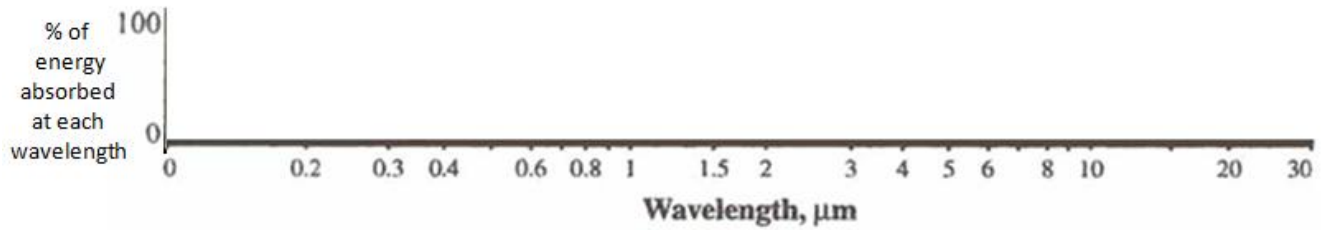
In a sentence or two, explain WHY you answered as you did:

Q2. Draw an absorption curve for a “perfect” greenhouse gas that absorbs ALL IR radiation, but no visible or UV:



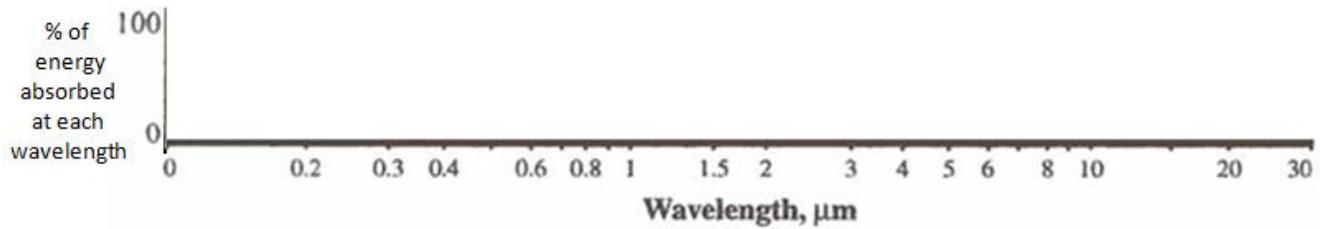
In a sentence or two, explain WHY you answered as you did:

Q3. Draw an absorption curve for a hypothetical gas that absorbs ALL UV radiation and ALL IR radiation, but leaves a “WINDOW” open for visible light, allowing the visible light wavelengths to pass through the gas unimpeded without being absorbed:



In a sentence or two, explain WHY you answered as you did:

Q4. Draw an absorption curve for a hypothetical gas that can absorb 100% of the IR radiation in these three wavelength bands: **band from 2 to 2.5 μm** **band from 3 to 4 μm** **band from 13 to 20 μm**



In a sentence or two, explain WHY you answered as you did:

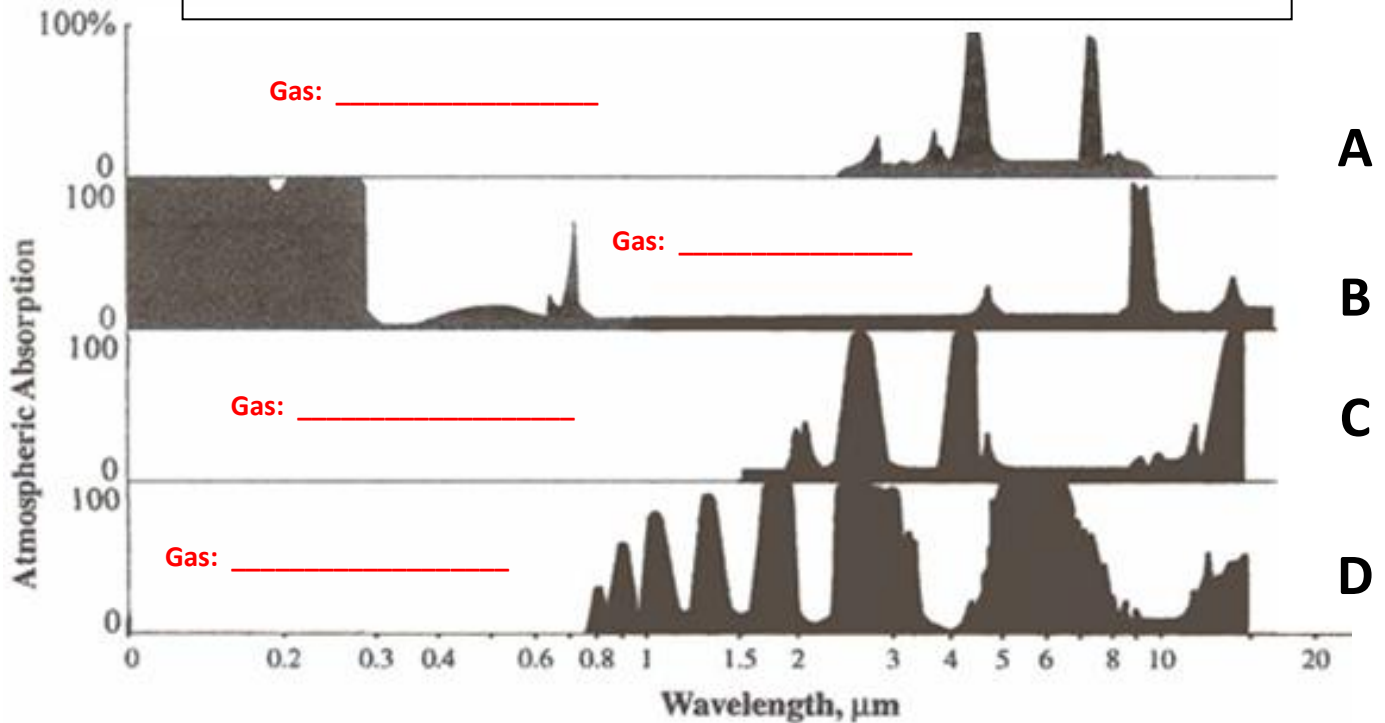
Q5. Is the hypothetical gas in Q4 likely to be a GREENHOUSE GAS? YES No **(circle one)**

Briefly explain WHY you answered YES or NO:

Q6. IDENTIFYING THE ABSORPTION CURVES OF INDIVIDUAL GASES

Gas	Primary absorption wavelengths (in micrometers)	
Water vapor (H ₂ O)	0.8	4 to 7
	1	9 to 10
	1.5	11 to 20
	2 to 3.5	
Molecular oxygen (O ₂) and Ozone (O ₃)	0.0001 to 0.280	
	8.5 to 10	
Nitrous oxide (N ₂ O)	4 to 5	
	7 to 7.5	
Carbon dioxide (CO ₂)	2 to 2.5	
	3 to 4	
	13 to 20	

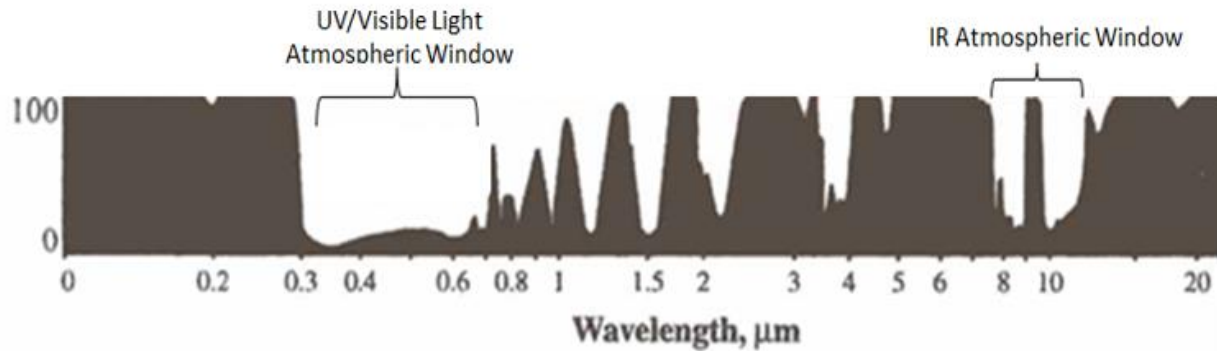
Based on the primary absorption wavelengths of each of gas shown in the table above, match the gases with their corresponding absorption curves below:



In a sentence or two, explain WHY you answered as you did:

THINKING MORE DEEPLY GROUP QUESTION

(write out your answer on a WHITEBOARD first, then copy down on this group form)



(1) Describe IN YOUR OWN WORDS **what the graph above represents.**

(2) Explain **WHAT IS HAPPENING TO THE RADIATION** at the wavelengths of each one of the two bracketed “**windows**” in the graph:

UV/Visible Light Atmospheric Window:

IR Atmospheric Window:

(3) Explain **WHY** these regions on the spectrum are referred to as “windows>”