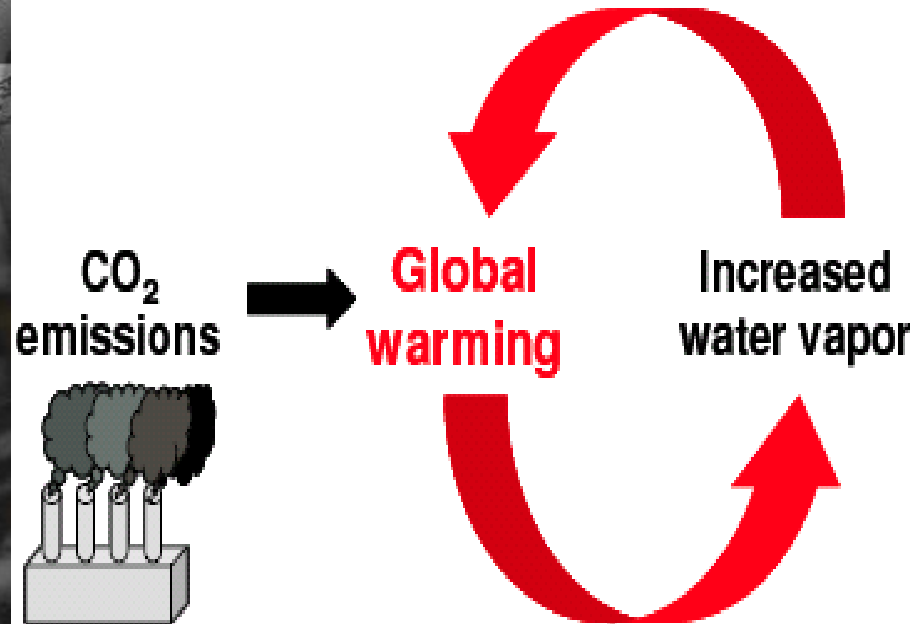


# WATER IN THE ATMOSPHERE

Unit 6 - Ch 18.1

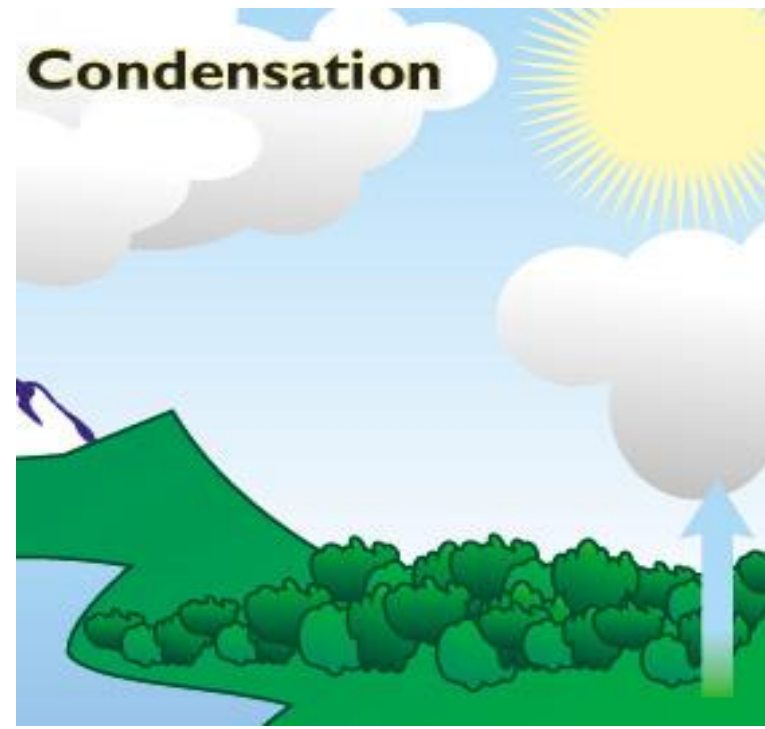
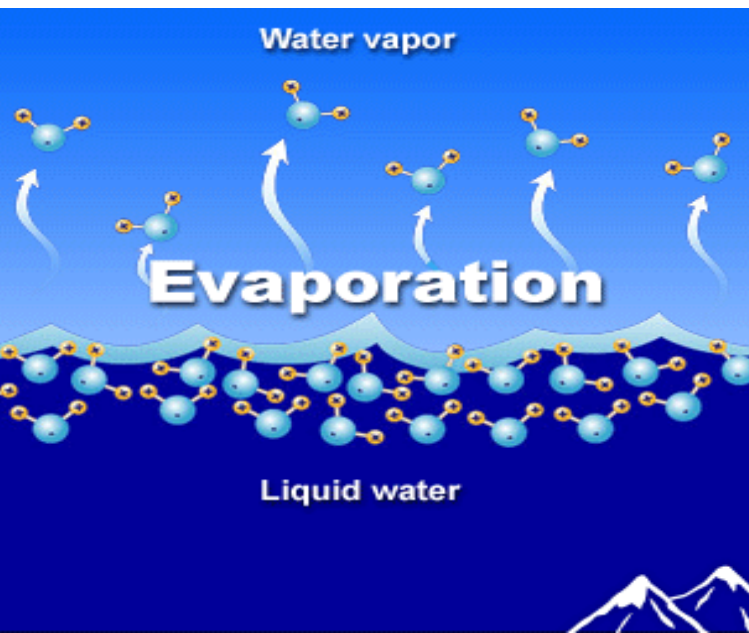
# WATER VAPOR

- In understanding *atmospheric* processes, water vapor is *most important greenhouse* gas



# WATER VAPOR

- As **warm** air **rises** via **evaporation** ( $l \rightarrow g$ ), it **condenses** ( $g \rightarrow l$ ) into **water vapor** & returns to surface via **precipitation**



# HUMIDITY

- Quantity (CONTENT) of *water vapor* in *air*





# HUMIDITY

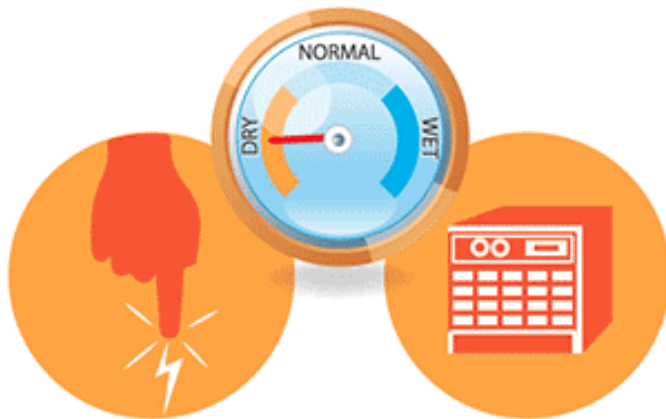
◎ Saturated - Max amount of *water vapor* that air *can* hold (CAPACITY)

## TOO DRY

LESS THAN

**15%**

HUMIDITY



You may notice you're getting zapped by door-knobs and light switches.

A humidifier will help increase humidity.

## TOO HUMID

GREATER THAN

**50%**

HUMIDITY

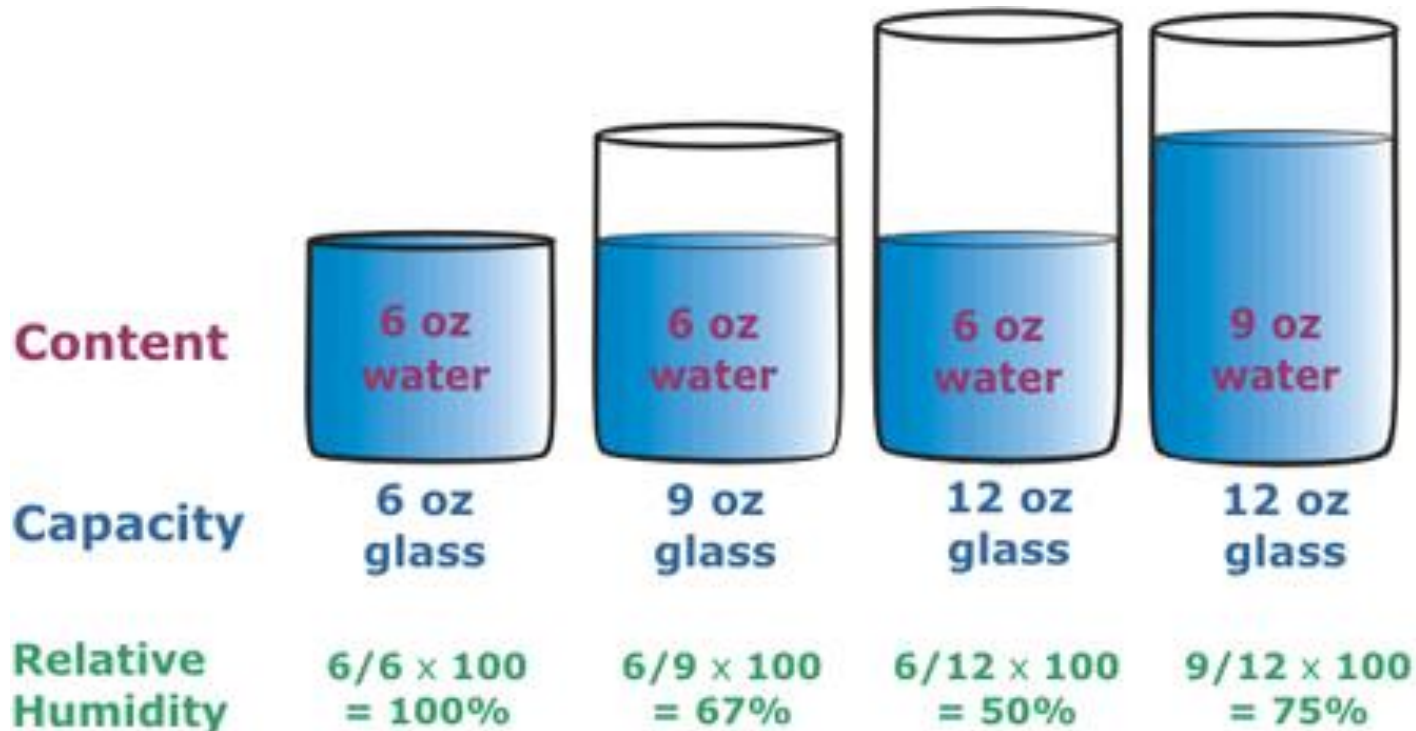


You may notice that your hair is frizzier than usual.

Air conditioning will help lower humidity.

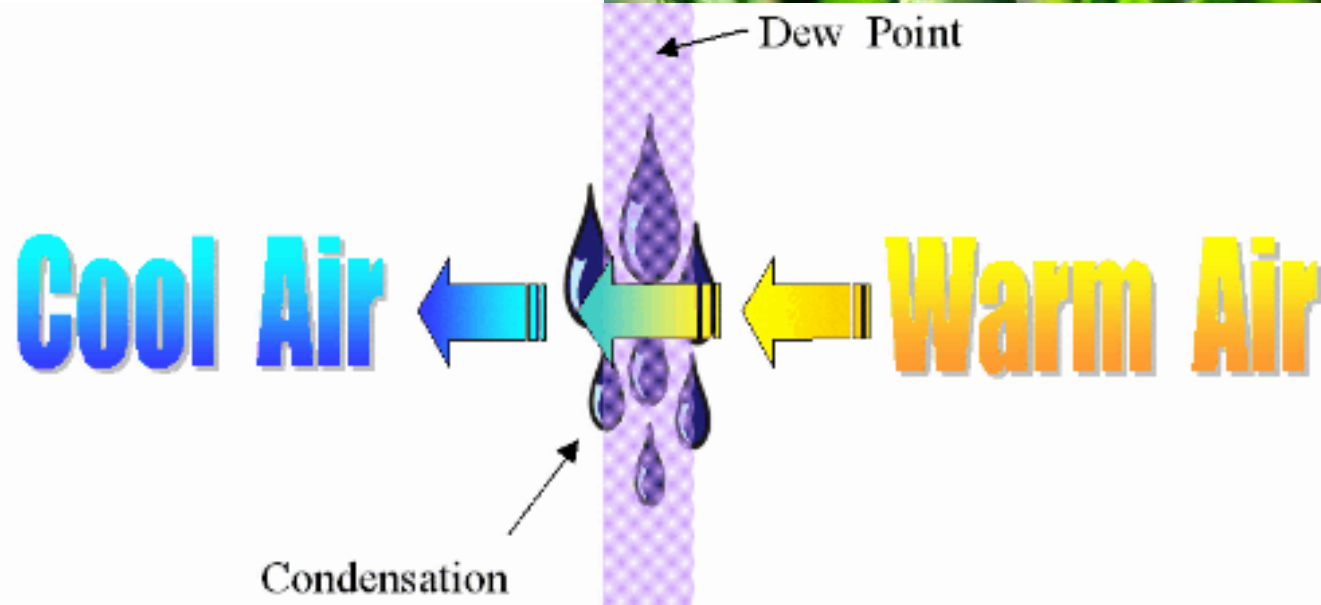
# RELATIVE HUMIDITY

- % RATIO of air's water vapor content compared to its capacity



# DEW POINT

- ◉ Temp at which *air* needs to be cooled to reach *saturation*



# MEASURING RELATIVE HUMIDITY

- Hygrometer - **Moisture** content in atmos
- Psychrometer - **dry-bulb & wet-bulb** thermometers
  - Measures difference in temps





# APPLICATION: RELATIVE HUMIDITY

How does the relative humidity compare on a warm, dry summer day versus a warm, rainy summer day?

- ◎ *Relative humidity is GREATER on warm, rainy summer day as the air is more saturated*

# APPLICATION: RELATIVE HUMIDITY

Suppose you hear on the radio that the relative humidity is 90% on a winter day. Can you conclude that this air contains more moisture than air on a summer day with a 40% relative humidity?

- ◉ *NO! 90% relative humidity on a winter day may still contain less moisture because colder air holds LESS water vapor than warmer air.*
  - *90% relative humidity value may be a result of the LOW water vapor content/capacity ratio of the winter air.*

# APPLICATION: RELATIVE HUMIDITY

**Why is a cool basement often damp in the summer?**

- ◎ *The temperature difference of the warm, humid air outside versus the cooler air inside the basement is GREATER, therefore allowing more condensation inside cooler environment.*

# MEASURING RELATIVE HUMIDITY

Table 2

Dry-Bulb Temp. (°C)	Relative Humidity (%)																			
	Difference Between Wet- and Dry-Bulb Temp. (°C)																			
	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°
-10	67	35																		
-9	69	39	9																	
-8	71	43	15																	
-7	73	48	20																	
-6	74	49	25																	
-5	76	52	29	7																
-4	77	55	33	12																
-3	78	57	37	17																
-2	79	60	40	22																
-1	81	62	43	26	8															
0	81	64	46	29	13															
1	83	66	49	33	17															
2	84	68	52	37	22	7														
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4	85	71	57	43	29	16														
5	86	72	58	45	33	20	7													
6	86	73	60	48	35	24	11													
7	87	74	62	50	38	26	15													
8	87	75	63	51	40	29	19	8												
9	88	76	64	53	42	32	22	12												
10	88	77	66	55	44	34	24	15	6											
11	89	78	67	56	46	36	27	18	9											
12	89	78	68	58	48	39	29	21	12											
13	89	79	69	59	50	41	32	23	15	7										
14	90	79	70	60	51	42	34	26	18	10										
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16	90	81	71	63	54	46	38	30	23	15	8									
17	90	81	72	64	55	47	40	32	25	18	11									
18	91	82	73	65	57	49	41	34	27	20	14	7								
19	91	82	74	65	58	50	43	36	29	22	16	10								
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32	93	86	80	74	68	62	57	51	46	41	37	32	28	24	20	16	12	9	5	
33	93	87	80	74	68	63	57	52	47	42	38	33	29	25	21	17	14	10	7	
34	93	87	81	75	69	63	58	53	48	43	39	35	30	28	23	19	15	12	8	5
35	94	87	81	75	69	64	59	54	49	44	40	36	32	28	24	20	17	13	10	7

Sling Psychrometer method:

- ◉ Dry-Bulb Temp = 22° C
- ◉ Wet-Bulb Temp = 16° C
- ◉ Relative Humidity =   ?
- ◉ 54%



# MEASURING RELATIVE HUMIDITY

Table 2

Dry-Bulb Temp. (°C)	Relative Humidity (%)																			
	Difference Between Wet- and Dry-Bulb Temp. (°C)																			
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34	93	87	81	75	69	63	58	53	48	43	39	35	30	28	23	19	15	12	8	5
35	94	87	81	75	69	64	59	54	49	44	40	36	32	28	24	20	17	13	10	7

Sling Psychrometer method:

- ◉ Dry-Bulb Temp = 16° C
- ◉ Wet-Bulb Temp = 14° C
- ◉ Relative Humidity =   ?
- ◉ 81%

# MEASURING RELATIVE HUMIDITY

Table 2

Dry-Bulb Temp. (°C)	Relative Humidity (%)																			
	Difference Between Wet- and Dry-Bulb Temp. (°C)																			
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35	94	87	81	75	69	64	59	54	49	44	40	36	32	28	24	20	17	13	10	7

Sling Psychrometer method:

- ◉ Dry-Bulb Temp = 18° C
- ◉ Wet-Bulb Temp =   ?
- ◉ Relative Humidity = 49%
  
- ◉ 12° C