

Duration: 50 min.

Date: August 30, 2019

Practical Test 1: Dew Point Temperature and Relative Humidity

Dew point temperature is defined as the temperature to which air must be cooled to become saturated with water vapor. When further cooled, the airborne water vapor will condense to form liquid water, i.e., dew, over the surface of an object. In this activity, you will measure the dew point temperature using two methods.

Method 1: Direct measurement of dew point temperature

Use the materials provided (stainless steel cup, ice, thermometer, and water) to measure the dew point temperature in the room.



Procedure:

- a. To begin with, keep the surface of the stainless steel cup dry.
- b. Measure the air temperature of the room.
- c. Pour water (at room temperature) into the cup.
- d. Slowly add ice to the cup.
- e. Measure the water temperature when dew starts forming on the surface of the cup

Q1) Repeat the procedure three times and record your results in Table below, and use the average value as your result.

	# 1	# 2	# 3	Average
Air temperature (°C)				
Dew point temperature (°C)				

Q2) Choose ALL the appropriate descriptions for the dew point temperature measurement you made above.

- a. If ice water was used in procedure 'c', the dew point temperature would have been higher.
- b. If ice water was used in procedure 'c', the dew point temperature would have been lower.
- c. Even if ice water was used in procedure 'c', the dew point temperature would not change.
- d. This experiment indicated that the air temperature right next to the cup becomes the same as the temperature of the water in the cup at almost the same time.
- e. This experiment indicated that air right next to the cup is more humid than the air in the room.

Method 2: Using a dry- and wet-bulb thermometer to determine dew point temperature

A dry- and wet-bulb thermometer allows us to measure the wet-bulb and dry-bulb temperatures.

Procedure:

- a. Make a wet-bulb thermometer using the following materials.
 - Using a rubber band, wrap the thermometer bulb with the gauze.
 - Wet the gauze by putting it into the water bottle.



- b. Measure the temperature of the wet-bulb and the dry-bulb.
Wet-bulb temperature : _____°C Dry-bulb temperature : _____°C
- c. Use the Table below to determine the relative humidity in the room.
- d. The relative humidity in the room is : _____%.

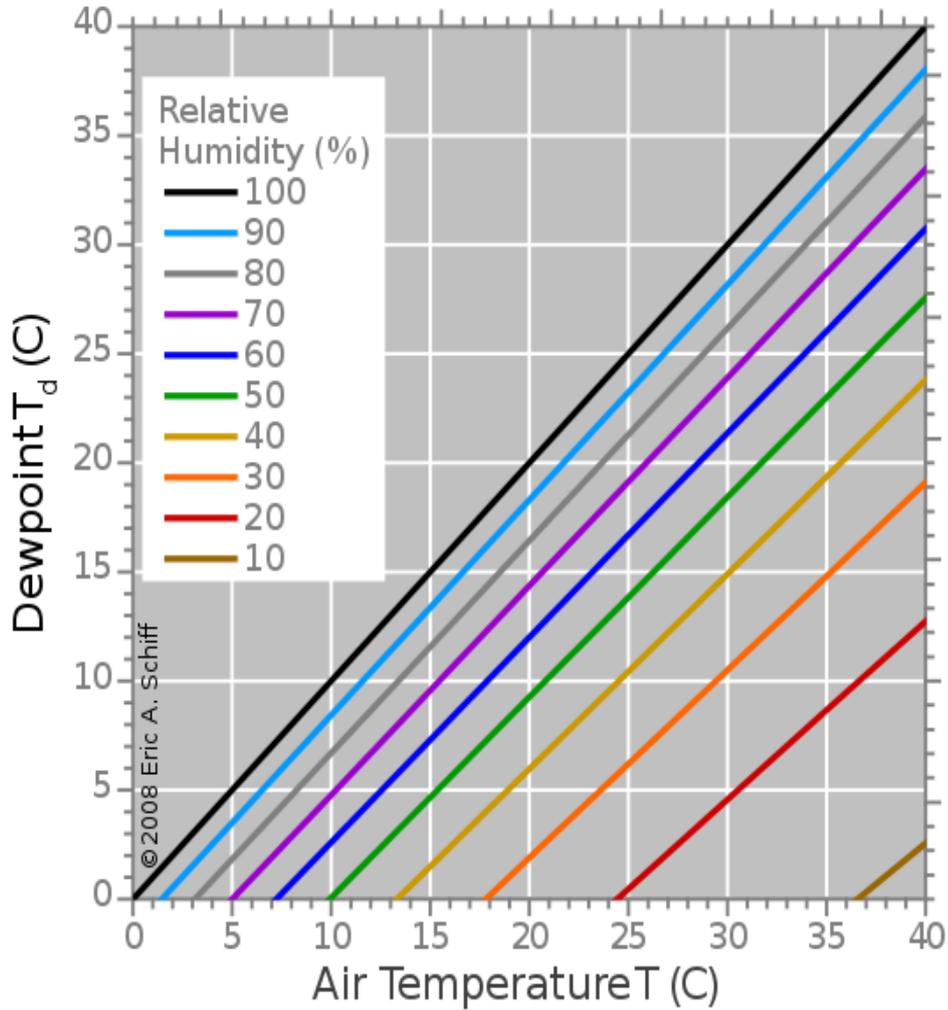


Table: The intersection of the dry-bulb temperature (the first column) with the difference between the temperatures of the dry bulb and the wet bulb (the top row) is the relative humidity (%).

Note: If the dry-bulb temperature or the temperature difference does not match the values given in the Table, interpolate the value between two relevant values of relative humidity.

Dry Bulb (°C)	Number of degrees difference between the wet- and dry-bulb readings (°C)									
	1	2	3	4	5	6	7	8	9	10
10	88%	77	66	56	45	35	26	16	7	--
11	89	78	67	57	47	38	28	19	11	2
12	89	79	68	59	49	40	31	22	14	5
13	89	79	69	60	51	42	33	25	16	9
14	90	80	70	61	52	43	35	27	19	11
15	90	80	71	62	54	45	37	29	22	14
16	90	81	72	63	55	47	39	31	24	17
17	91	82	73	64	56	48	41	33	26	19
18	91	82	73	65	57	50	42	35	28	21
19	91	82	74	66	58	51	44	37	30	24
20	91	83	75	67	59	52	45	38	32	26
21	91	83	75	68	60	53	47	40	34	27
22	92	84	76	69	61	54	48	41	35	29
23	92	84	77	69	62	56	49	43	37	31
24	92	84	77	70	63	57	50	44	38	32
25	92	85	77	71	64	57	51	45	40	34
26	92	85	78	71	65	58	52	46	41	35
27	93	85	78	72	65	59	53	47	42	37
28	93	86	79	72	66	60	54	49	43	38
29	93	86	79	73	67	61	55	50	44	39
30	93	86	80	73	67	61	56	50	45	40
31	93	86	80	74	68	62	57	51	46	41
32	93	87	80	74	68	63	57	52	47	42
33	93	87	81	75	69	63	58	53	48	43
34	93	87	81	75	69	64	59	54	49	44

Q3) Using the figure below and the results of the measurements you made, complete the table below.



Measurement method	Dry-bulb temperature (°C)	Wet-bulb temperature (°C)	Relative humidity (%)	Dew point temperature (°C)
Using a stainless steel cup		X		
Using a wet- and dry-bulb thermometer				



Q4) Choose ALL the appropriate descriptions for the estimation of relative humidity using a dry- and wet-bulb thermometer.

- a. A large difference between dry- and wet- bulb temperatures indicates a high relative humidity.
- b. A small difference between dry- and wet- bulb temperatures indicates a high relative humidity.
- c. The difference between dry- and wet- bulb temperatures can sometimes be negative when the environment is extremely humid.
- d. A small difference between dry- and wet- bulb temperatures in a cold environment, indicates a larger relative humidity than in a warm environment.
- e. A small difference between dry- and wet- bulb temperatures in a warm environment indicates a larger relative humidity than in a cold environment.

Q5) Choose ALL the appropriate descriptions for the estimation of dew point temperature by using a dry- and wet-bulb thermometer.

- a. As long as relative humidity is constant, dew point temperature remains constant even if dry-bulb temperature changes.
- b. Even if relative humidity is constant, dew point temperature can change when dry-bulb temperature changes.
- c. A high value of dew point temperature indicates that the air contains a large amount of water vapor.
- d. A high value of dew point temperature indicates that the air contains a small amount of water vapor.
- e. Dew point temperature is not an indicator of the absolute amount of water vapor in the air.