Topic: Humidity

Teacher Information

Time Allowance
55 minutes

Background
Humidity is the measure of moisture in the air. Humidity is an important consideration on board a spacecraft, as too much or too little water vapor in the air can cause problems for both the astronauts and their equipment.

The total amount of water vapor that the air holds is dependent upon air temperature. The warmer the air, the more water vapor it holds. If the air is holding all of the water that it can, it is called saturation, and the measure of humidity would be 100%.

The chilled mirror method involves cooling a shiny surface until water condenses on it. The temperature at which this occurs is the dew point temperature. Students will use this method to simulate condensation at the dew point and take a measure of the humidity levels in the room.

Materials (per group)
metal can with shiny surface
thermometer
water
ice
newspaper
student data log

Topic: Dew point and Relative Humidity

Student Information

Background

Humidity is the measure of moisture in the air. Humidity is an important consideration on board a spacecraft, as too much or too little water vapor in the air can cause problems for both the astronauts and their equipment.

Materials (per group)

metal can with shiny surface
play dough (thermometer stand)
2 thermometers
water
ice
newspaper
data log

Procedure

1. Fill a can about halfway full with room temperature water.
2. Make sure that the can's label has been removed and that the outside surface of the can is dry.
3. Place the can on a piece of newspaper.
4. Place one thermometer in the water and measure its temperature.
5. Place the other thermometer in the thermometer stand (lump of play dough.)
6. Write this number on your data log.
7. Carefully place a piece of ice in the can and stir slowly.
8. Watch the outside of the can for any signs of moisture accumulation.
9. If your ice has melted and no moisture or condensation is present, carefully add another piece of ice.
10. When your team sees condensation on the outside of the can, read the temperature on both thermometers.
11. Record these numbers in the proper space on the data log. This is the dew point temperature.
12. Answer the questions on your data log.
13. Using the air temperature and dew point just measured; find the relative humidity on the chart. Record this number on your data log.
14. Determine the relative humidity of the air using the numbers you just measured. Record this number on your data log.

Topic: Dew point and Relative Humidity

Data Log

Temperature of water before ice was added:_____

Temperature of water when condensation was first noticed: _____
(dew point)

Temperature of room when condensation was first noticed: _____

Questions

1. Where did the water on the outside of the can come from?

2. Have you ever noticed this sort of thing happening before?

3. Using the Air Temperature and Dew Point Chart, calculate the percent of humidity present in the classroom air. Record this number here.

4. Repeat the experiment to verify your results.

Air Temperature and Dew Point Chart

DEWPOINT TEMPERATURE (ºF)

AIR TEMPERATURE (ºF)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
0	100															
5	79	100														
10	63	79	100													
15	50	63	80	100												
20	40	51	63	80	100											
25	32	41	52	64	80	100										
30	27	33	41	54	65	80	100									
35	22	29	34	42	54	65	81	100								
40	20	23	29	35	44	53	65	82	100							
45	15	20	24	28	36	45	55	66	82	100						
50	13	15	20	24	30	37	46	54	66	83	100					
55	9	13	16	20	21	31	38	47	51	67	83	100				
60	7	10	14	17	20	23	27	39	48	56	70	84	100			
65	7	9	11	14	18	22	27	33	40	59	56	70	84	100		
70	6	8	10	12	15	18	23	26	34	41	49	58	71	84	100	
75	5	6	8	10	12	16	19	23	29	34	42	50	60	71	84	100
80	4	5	7	9	11	13	16	20	24	28	35	42	51	60	71	85
85	4	5	6	7	9	11	14	17	20	25	30	35	43	53	61	72
90	3	4	5	6	8	10	12	15	17	21	28	31	37	44	54	62
95	3	3	4	5	7	8	10	12	16	19	23	28	31	33	44	55
100	2	3	4	5	6	7	9	11	13	17	20	23	29	32	36	45