

9ª Lista de exercícios – ACA 0115 – Introdução às Ciências Atmosféricas

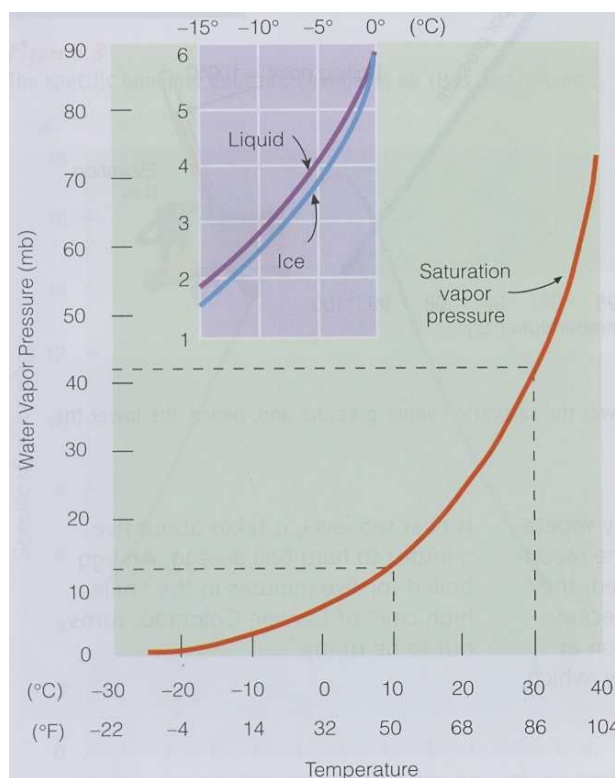
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1 – Utilizando a tabela abaixo, determine:

AIR TEMPERATURE (°C)		SATURATION VAPOR PRESSURE (MB)	AIR TEMPERATURE (°F)		SATURATION VAPOR PRESSURE (MB)
-18	(0)	1.5	18	(65)	21.0
-15	(5)	1.9	21	(70)	25.0
-12	(10)	2.4	24	(75)	29.6
-9	(15)	3.0	27	(80)	35.0
-7	(20)	3.7	29	(85)	41.0
-4	(25)	4.6	32	(90)	48.1
-1	(30)	5.6	35	(95)	56.2
2	(35)	6.9	38	(100)	65.6
4	(40)	8.4	41	(105)	76.2
7	(45)	10.2	43	(110)	87.8
10	(50)	12.3	46	(115)	101.4
13	(55)	14.8	49	(120)	116.8
16	(60)	17.7	52	(125)	134.2

- a) A umidade relativa, para temperatura de 18°C e ponto de orvalho de 13°C;
- b) A pressão de vapor para temperatura do ar de 32°C e umidade relativa de 65%.

2 – Baseando-se na figura abaixo, responda verdadeiro ou falso e justifique:



- a) Em temperaturas mais altas, é preciso de mais vapor d'água para saturar o ar.

- b) Quanto menor a pressão de vapor de saturação em um certo volume, menor o número de moléculas de vapor neste volume.
- c) Em qualquer temperatura abaixo do congelamento, é preciso mais moléculas de vapor para saturar o ar diretamente acima da água do que para saturar o ar diretamente acima do gelo.

3 – Leia o texto e responda:

**Focus on A SPECIAL TOPIC**

### Vapor Pressure and Boiling—The Higher You Go, the Longer Cooking Takes

If you camp in the mountains, you may have noticed that, the higher you camp, the longer it takes vegetables to cook in boiling water. To understand this observation, we need to examine the relationship between vapor pressure and boiling. As water boils, bubbles of vapor rise to the top of the liquid and escape. For this to occur, the saturation vapor pressure exerted by the bubbles must equal the pressure of the atmosphere; otherwise, the bubbles would collapse. Boiling, therefore, occurs when the saturation vapor pressure of the escaping bubbles is equal to the total atmospheric pressure.

Because the saturation vapor pressure is directly related to the temperature of the liquid, higher water temperatures produce higher vapor pressures. Hence, any change in atmospheric pressure will change the temperature at which water boils: An increase in air pressure raises the boiling point, while a decrease in air pressure lowers it. Notice in Fig. 1 that, to make pure water boil at sea level, the water must be heated to a temperature of 100°C (212°F). At Denver, Colorado, which is situated about 1500 m (5000 ft) above sea level, the air pressure is near 850 millibars, and water boils at 95°C (203°F).

Once water starts to boil, its temperature remains constant, even if you continue to heat it. This happens because energy supplied to the water is used to convert the liquid to a gas (steam). Now we can see why vegetables take longer to cook in the mountains. To be thoroughly cooked, they must boil for a longer time because the boiling water is cooler than at lower levels. In New York City, which is near sea level, it takes about five minutes to hard boil an egg. An egg boiled for five minutes in the "mile high city" of Denver, Colorado, turns out to be runny.

**Figure 1**  
The lower the air pressure, the lower the saturation vapor pressure and, hence, the lower the boiling point temperature.

- a) Por que demora mais para cozinhar vegetais nas montanhas do que na praia?
- b) Por que quando a água começa a ferver, sua temperatura permanece constante, mesmo se fornecermos mais calor para aquecê-la?

4 – Por que dias quentes e úmidos de verão geralmente parecem mais quentes do que os dias quentes e secos?