

Moisture Measurement

Directions: Be sure to show intermediate, necessary steps. You may work cooperatively, but each student must turn her/his own work.

1. Calculate the mixing ratio (MR) for a parcel with a temperature of 15°C , pressure of 1000 mb that is (a) 1% water vapor (b) 4% water vapor.
2. Calculate the mixing ratio (MR) for a parcel with a temperature of 0°C , pressure of 850 mb that is (a) 1% water vapor (b) 4% water vapor.
3. (a) A parcel at the surface of the earth, where pressure is 1020 mb, has a mixing ratio of 10 g/kg. Calculate the vapor partial pressure of the parcel.
(b) Suppose the parcel is lifted to the 700 mb pressure level. Assuming the parcel's mixing ratio is conserved, calculate the vapor partial pressure at the parcel's new height.
4. (a) A parcel at the surface of the earth, where pressure is 1000 mb, has a mixing ratio of 20 g/kg. Calculate the vapor partial pressure of the parcel.
(b) Suppose the parcel is lifted to the 850 mb pressure level. Assuming the parcel's mixing ratio is conserved, calculate the vapor partial pressure at the parcel's new height.
5. Given that a parcel of air has a temperature of 15°C , determine the saturation vapor pressure relative to a water surface.
6. A parcel of air has a saturation vapor pressure of 15 mb. Determine the parcel's temperature in $^{\circ}\text{C}$.
7. Suppose a parcel's saturation vapor pressure is 12 mb. Determine the parcel's temperature in $^{\circ}\text{C}$.
8. A parcel of air has a saturation vapor pressure of 2 mb (relative to a water surface). Determine the parcel's temperature in $^{\circ}\text{F}$.
9. A parcel has temperature of 25°C and a vapor pressure of 10 mb.
 - (a) Calculate the relative humidity of the parcel.
 - (b) Determine the dew point of the parcel.
10. Suppose a parcel at the surface of the earth has a relative humidity of 90% and a temperature of 50°F . Determine the mixing ratio of the parcel.
11. Suppose a surface parcel (so pressure is 1000 mb) has a relative humidity of 70% and a temperature of 90°F . Determine the mixing ratio of the parcel.
12. A parcel of air has a temperature of 60°F and a dew point of 45°F . Determine the relative humidity of the parcel.
13. A parcel of air has a temperature of 80°F and a dew point of 35°F . Determine the relative humidity of the parcel.
14. Suppose a parcel of air has a temperature of 75°F and a relative humidity of 50%. Determine the parcel's dew point temperature.
15. Suppose a parcel of air has a temperature of 45°F and a relative humidity of 80%. Determine the parcel's dew point temperature.
16. A air parcel near the surface of the earth has a dew point temperature of 10°C and a relative humidity of 90%. Determine the parcel's temperature.
17. A air parcel near the surface of the earth has a dew point temperature of 20°C and a relative humidity of 70%. Determine the parcel's temperature.