Answer on Question #57761, Physics / Solid State Physics

A morning fog generally vanishes before noon. Explain its answer with mathematical calculation. If it has calculation.

Solution:

Fog – atmospheric phenomenon, in which the water vapor molecules accumulates in air. Two types of fog: fog of evaporation and fog of cooling.

In this case – the fog of evaporation. This type of fog formed over the ponds or over wet areas of land. The air adjacent to a particular surface. At night, the air cools faster than this surface. And so the air has a lower temperature than this surface. With warmer surface to colder air evaporates the additional amount of water vapor. It is fog of evaporation.

Relative humidity air when the fog is about 100% (during severe frost in the pollution emissions air the fog can occur at much lower relative humidity).

The relative humidity φ is calculated using the formula:

$$\varphi = \frac{\rho_{abs}}{\rho_{sat}} \times 100\% \ (1),$$

where ρ_{abs} – absolute humidity (amount of water vapor in 1 m^3),

ρ_{sat} – vapor density at the same temperature.

The air is heated well before noon. The temperature of air increases and evaporation into the air decreases. With increasing temperature, absolute humidity decreases.

From the formula (1) $\Rightarrow$ if the absolute humidity ρ_{abs} decreases, the relative humidity φ decreases also.

Reducing the relative humidity leads to the disappearance of fog.