Atmospheric Science

Que :- How much latent heat is released when 2kg of water vapour condenses into liquid ?

Solution

Given $m_{vapour} = 2kg$

L_V = Latent - heat factor for condensation & vapourisation

$= 2.5 \times 10^6 J \cdot kg^{-1}$ (constant value)

$\Delta Q_E = ?$ J (Latent heat)

$\Delta Q_E = L_V \cdot \Delta m_{water}$

where Δm_{water} = mass of phase changed water

$\Delta Q_E = (2.5 \times 10^6 J \cdot kg^{-1}) \cdot (2kg)$

$= 5000$ kJ

Que→ find the Potential temperature for air at $Z = 500\ m$ (height) with $T = 10°C$

Solution-

Given = $Z = 500\ m$ (height)

$T = 10°C$ (actual temp.)

$\Theta = ?\ °C$ (Potential temp.)

Assume no liquid water

$$\Theta(z) = T(z) + \Gamma_d \cdot Z$$

(Γ_d → constant = $9.8\ °C/km$)

$$\Theta = (10°C) + (9.8\ °C/km) * (0.5)$$

$$= 14.9\ °C$$

Point to be noted

This is the T that air would have when lowered dry adiabatic to surface. Θ are always greater than actual temp T for Z above the reference level.