Physics 102-Rec
Quiz#3-Sect.23
Chapter 18

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Name: Key Id:

A 50 g of steam at 100 °C is cooled to 0 °C ice. How much heat is lost by the water during this process?

Given:
Specific heat of water is 1 cal/g K.
Latent heat of fusion of ice is 80 cal/g.
Latent heat of vaporization of steam is 540 cal/g.

100°C steam ⟶ 100°C water $Q_1 = -mL_v$

100°C water ⟶ 0°C water $Q_2 = mc\Delta T$

0°C water ⟶ 0°C ice $Q_3 = -mL_f$

$Q_1 = -50 \times 540 = -27000$ cal

$Q_2 = 50 \times 1 \times (0 - 100) = -5000$ cal

$Q_3 = -50 \times 80 = -4000$ cal

$Q_{Total} = Q_1 + Q_2 + Q_3 = \boxed{-36000 \text{ cal}}$