

Question#19615

. How much heat must a refrigerator remove from 100 g of water at 25 ° C to convert it to ice at 0° C?
(Specific heat of water = 1 cal /g° C and heat of fusion of ice = 80 cal/g at 0° C)

Solution:

Let:

$$m = 100 \text{ g}$$

$$T_2 = 0^\circ\text{C}$$

$$T_1 = 25^\circ\text{C}$$

$$c = 1 \text{ cal/g}^\circ\text{C}$$

$$\lambda = 80 \text{ cal/g}^\circ\text{C}$$

Q —?

$Q = Q_1 + Q_2$, where: Q_1 — heat of cooling water from 25°C to 0°C, Q_2 — heat of freezing

$$Q = mc(T_1 - T_2) + \lambda m = m(c(T_1 - T_2) + \lambda)$$

$$Q = 100(1 * 25 + 80) = 10500 \text{ cal}$$

Answer: 10500 kal. Or 10.5 Kcal.