Answer on Question #52984, Physics / Molecular Physics | Thermodynamics

1. 200g of water heated from 17.0 degrees Celsius to 23.5 degrees Celsius . What is the amount of thermal energy that been transferred to that mass?

Solution

$$Q = mc\Delta t = 0.2 \times 4.187 \times (23.5 - 17) = 5.4431 \, KJ$$

Answer : 5.4431 KJ.

2. Beaker contains 360.4g of whiten the liquid state at 100 degrees Celsius . How much energy in KJ is required to convert the liquid water to water vapours?

Solution

$$Q = Lm = 2256 \times 0.3604 = 813.0624 KJ$$

Answer : 813.0624 KJ.

3. what is the amount of heat energy required to change a 40.0g ice cube at -20.0 degrees Celsius to water at 50.0 degrees Celsius ?

Solution

If melting point of ice T=0˚C.

$$Q = Q_1 + Q_2 + Q_3 ; \quad Q_1 = mc_{ice}\Delta t = 0.04 \times 2060 \times 20 = 1648 \, J;$$

$$Q_2 = \lambda m = 335000 \times 0.04 = 13400 \, J; \quad Q_3 = mc_{water}\Delta t = 0.04 \times 4187 \times 50 = 8374 \, J;$$

$$Q = 1648 + 13400 + 8374 = 23422 \, J$$

Answer : 23422 J

4. 500g mass of copper at 15.0 degrees Celsius, copper gains 650 joules of thermal energy. What would be final temperature of that mass? (c=0.386 j/g degrees Celsius)

Solution

$$Q = mc\Delta t = mc(t_2 - t_1); \qquad \qquad t_2 = \frac{Q}{mc} + t_1;$$

$$t_2 = \frac{650}{500 \times 0.386} + 15 = 18.368 \, ℃$$

Answer : 18.368 ℃