Answer on Question#38363-Chemistry-Other

Questions

1) Calculate the heat energy required to raise the temperature of 2.2kg $H_2O(l)$ from 25^oC to 98^oC.

2) 500g of pure Al(s) must be heated from 20^oC to its melting point. How many joules of energy will be needed?

3) A 200.0g block of $H_2O(s)$ is to be heated from -20^oC to -5^oC. Determine the heat required?

Solution

1) Reference datum needed to solve the task is

specific heat capacity of liquid water: $C = 4.19 \cdot 10^3$ J/kg·K (we assume the specific heat capacity is constant and does not depend on temperatue).

The heat energy required to raise the temperature of 2.2 kg $H_2O(l)$ from 25^oC to 98^oC is calculated as

$$Q = m \cdot C \cdot \Delta T = 2.2 \cdot 4.19 \cdot 10^3 \cdot (98-25) = 672914 \text{ J}$$

2) Reference data needed to solve the task are

specific heat capacity of pure solid aluminium: $C = 8.97 \cdot 10^2$ J/kg·K (we assume the specific heat capacity is constant and does not depend on temperatue) and

melting point of aluminium T = 660^oC.

The heat energy required to heat 0.5 kg of Al(s) from 20^oC to its melting point is

$$Q = m \cdot C \cdot \Delta T = 0.5 \cdot 8.97 \cdot 10^2 \cdot (660-20) = 287027 \text{ J}$$

3) Reference datum needed to solve the task is

specific heat capacity of ice: $C = 2.06 \cdot 10^3$ J/kg·K (we assume the specific heat capacity is constant and does not depend on temperatue).

The heat energy required to heat 0.2 kg block of $H_2O(s)$ from -20^oC to -5^oC is

$$Q = m \cdot C \cdot \Delta T = 0.2 \cdot 2.06 \cdot 10^3 \cdot ((-5)-(-20)) = 6180 \text{ J}$$

Answers

1) 672914 *J*

2) 287027 *J*

3) 6180 *J*