

Molar Heat of Fusion of Ice – Sample Worksheet

Data:

1	Mass of cup	_____ 5.50 g
2	Mass of cup plus warm water	_____ 155.50 g
3	Initial temperature of “warm” water	_____ 30.5 °C
4	Initial temperature of ice	_____ 0.0 °C
5	Final temperature of the “mixture”	_____ 18.5 °C
6	Mass of cup plus “mixture”	_____ 175.50 g

Results:

7	Mass warm water	_____ 150.00 g 2-1
8	Mass ice	_____ 20.00 g 6-2
9	Temperature change of “warm” body	_____ 12.0 °C 3-5
10	Temperature change of “cool” body	_____ 18.5 °C 5-4
11	Heat energy lost by “warm” body	$\left. \begin{array}{l} \xrightarrow{\text{752.4 J}} \\ \xrightarrow{\text{752.4 J}} \end{array} \right\} \begin{array}{l} \text{(sp.ht.)(mass)(}\Delta T\text{)} \\ \text{(4.18 J/g}^\circ\text{C)(150.00 g)(12.0}^\circ\text{C)} \\ \phantom{\text{(4.18 J/g}^\circ\text{C)(150.00 g)(12.0}^\circ\text{C)}} \end{array}$
12	Heat energy gained by “cool” body	_____ 752.4 J
13	Heat of fusion per gram of ice	_____ 299 J/g \rightarrow See steps 1 – 5 Below
14	Heat of fusion per mole of ice (Molar Heat of Fusion)	_____ 5380 J/mole \rightarrow $(299 \text{ J/g}) \left(\frac{18.0 \text{ g}}{1 \text{ mole}} \right)$

Steps:

1. $7520 \text{ J} = H \text{ (melt ice)} + H \text{ (increase temperature of cool body)}$
2. $7520 \text{ J} = (\Delta H_{\text{fusion}} \circ \text{mass}) + (\text{sp.ht.} \circ \text{mass} \circ \Delta T)$
3. $7520 \text{ J} = (\Delta H_{\text{fusion}} \circ 20.00 \text{ g}) + (4.18 \text{ J/g}^\circ\text{C} \circ 20.00 \text{ g} \circ 18.5 \text{ }^\circ\text{C})$
4. $7520 \text{ J} = (\Delta H_{\text{fusion}} \circ 20.00 \text{ g}) + 1550 \text{ J}$
5. $5970 \text{ J} = \Delta H_{\text{fusion}} \circ 20.00 \text{ g} \rightarrow \frac{5970 \text{ J}}{20.00 \text{ g}} = \Delta H_{\text{fusion}} \rightarrow 299 \text{ J/g}$