

Topic 3 – Thermal physics

PROBLEM SET

THIS IS A PRACTICE ASSESSMENT. Show formulas, substitutions, answers, and units!

Topic 3.1 – Thermal concepts

The following questions are about changing the temperature and phase of a 0.50-kg piece of ice. Its starting temperature is -35°C .

14. The ice is warmed up to 0.0°C without melting. How much heat energy in Joules is needed?



15. The ice at 0°C is now warmed up until it all melts, becoming water at 0°C . How much heat energy in Joules is needed?

Substance	$\text{J/kg}\cdot\text{C}^{\circ}$
Water	4186
Steam	2010
Ice	2100

Melting Point C°	L_f J/kg	Boiling Point C°	L_v J/kg
0	3.33×10^5	100	22.6×10^5

16. The water at 0°C is now warmed up until it reaches a temperature of 100°C but does not begin to boil. How much heat energy in Joules is needed?

17. The water at 100°C is now warmed up until it all turns into steam at a temperature of 100°C . How much heat energy in Joules is needed?

18. The steam at 100°C is now warmed up until it reaches a temperature of 135°C . How much heat energy in Joules is needed?

19. 0.50 kilograms of ice at -35°C is warmed up to become steam at 135°C . How much heat energy in Joules is needed?