

Phys 117 HW #10 Problems

Ch 13 Q 13, 27, 34; Ex 7, 13, 18
Ch 14 Q 3, 5; Ex 1, 5.

13. What is the difference between heat and temperature?
27. Given that the melting and freezing temperatures of water are identical, what determines whether a mixture of ice and water will freeze or melt?
34. A new liquid is discovered that has the same boiling point and specific heat as water but a latent heat of vaporization of 10 calories per gram. Assuming that this new liquid is safe to drink, would it be more or less convenient than water for boiling eggs? Why?
7. During a process, 28 J of heat are transferred into a system, while the system itself does 12 J of work. What is the change in the internal energy of the system?
13. Six grams of liquid X at 35°C are added to 3 grams of liquid Y at 20°C . The specific heat of liquid X is $2 \text{ cal/g} \cdot ^{\circ}\text{C}$, and the specific heat of liquid Y is $1 \text{ cal/g} \cdot ^{\circ}\text{C}$. If each gram of liquid X gives up two calories to liquid Y, find the change in temperature of each liquid.
18. How much heat would it take to melt a 1-kg block of ice?
3. Why is it not possible to run an ocean liner by taking in seawater at the bow of the ship, extracting internal energy from the water, and dropping ice cubes off the stern?
5. In an ideal heat engine, 1000 joules of energy are extracted from the hot region at 800 K. One of the laws of thermodynamics requires that if the cold region is at 320 K, the engine must exhaust 400 joules of energy. Which law of thermodynamics requires this?
1. What input energy is required if an engine performs 300 kJ of work and exhausts 400 kJ of heat?
5. What is the efficiency of a heat engine that does 50 J of work for every 200 J of heat it takes in?