

Homework 4

100 points

Instructions: Submit in canvas a copy of your solution (please do not email me your solutions). No late solutions will be accepted.

Multiple Choice (5 points each)

Choose one choice in the following multiple-choice questions:

1. Temperature is a relative measure of
 - a. latent heat.
 - b. hotness and coldness.
 - c. internal energy.
 - d. amount of heat stored in a substance
 - e. none of these.

2. The average kinetic energy of the molecules in a gas is a measure of
 - a. volume.
 - b. density.
 - c. temperature.
 - d. heat content.
 - e. none of these.

3. What is the temperature that is the same numerical value on both the Fahrenheit and Celsius scale?
 - a. 212°
 - b. 0°
 - c. -40°
 - d. -273°
 - e. None of these.

4. The amount of heat necessary to change the temperature of 1 kg of a substance 1°C is
 - a. 1 cal.
 - b. the specific heat.
 - c. the heat difference.
 - d. 1 J.
 - e. none of these

5. Which thermodynamic law is equivalent to the law of conservation of energy including heat:

- a. second law of thermodynamics
- b. third law of thermodynamics
- c. law of increasing entropy
- d. first law of thermodynamics
- e. none of these.

Problems (15 points each)

Write down the formula and show all steps to receive full credit.

1. The Fahrenheit temperature reading is 98° on a hot summer day. What is this reading on the Kelvin and the Celsius scale?

2. A 4,000.0 kg car with a speed of 75.0 km/h brakes to a stop. How many kilocalories of heat are generated by the brakes as a result of stopping?

3. How much heat must be supplied to a 650.0 g copper pan to raise its temperature from 23.0°C to 100.0°C? Use the specific heat of copper given by in table 4.2 of the textbook or lecture notes.

4. How much heat is necessary to change 100 g of ice at -8°C into water at 23°C ?

5. A heat engine operates with 80.0kcal of heat supplied and exhaust 38.0kcal of heat. How much work in joules did the engine do?