

Thermodynamics exercise 1st and 2nd law, volumetric work, heat - 2020

Glencoe p. 326 – Example problem + practice problems

Glencoe p. 328 - dtto

Glencoe p. 329 – consider problems

Glencoe p. 334 – practice problems

1. The working cycle of the Carnot ideal engine consists of:

- a) only one isothermal and adiabatic process
- b) one isothermal and two adiabatic processes
- c) two isothermal and two adiabatic processes
- d) two isochoric and two isobaric processes
- e) No answer is correct.

2. The unit of heat capacity is:

- a) J
- b) $\text{J}\cdot\text{m}^{-3}$
- c) $\text{J}\cdot\text{mol}^{-1}$
- d) $\text{W}\cdot\text{s}$
- e) No answer is correct.

3. The First law of thermodynamics represents:

- a) a rule describing spontaneous increase of disorder in an isolated system
- b) a rule describing transformation of heat in free energy
- c) a rule describing spontaneous decrease of disorder in an isolated system
- d) a special application of the law of conservation of energy
- e) No answer is correct.

4. The 2nd law of thermodynamics represents:

- a) a special formulation of energy conservation principle
- b) a rule describing decrease of entropy in an isolated system
- c) a rule describing spontaneous ordering of an isolated system
- d) a rule describing spontaneous increase of disorder in an isolated system
- e) No answer is correct.

5. The 2nd law of thermodynamics represents:

- a) a special formulation of energy conservation principle
- b) a rule describing increase of entropy in an isolated system
- c) a rule describing spontaneous ordering of an isolated system
- d) a rule describing spontaneous decrease of disorder in an isolated system
- e) No answer is correct.

6. The mechanical (volumetric) work of a perfect gas is proportional:

- a) to its volume
- b) to its temperature
- c) to its pressure
- d) to the gas entropy
- e) No answer is correct.

7. The work done by an ideal (perfect) gas at constant pressure is given by the term:

- a) p/V
- b) $p\cdot\Delta V$
- c) $n\cdot R\cdot T$
- d) $\Delta p\cdot V$
- e) No answer is correct.

8. The work done by an ideal (perfect) gas at constant volume is given by the term:

- a) p/V
- b) $p\cdot V$
- c) $n\cdot R\cdot T$
- d) $\Delta p\cdot V$
- e) No answer is correct.

9. The term $c\cdot m\cdot\Delta t$, where c is specific heat of the homogeneous body, m is a mass of this body, and t its temperature, has the same unit as:

- a) universal gas constant R
- b) pressure
- c) work
- d) Avogadro constant
- e) No answer is correct.

10. Heat cannot be exchanged by systems:

- a) without having a mutual mechanical contact
- b) with different temperatures
- c) with the same temperatures
- d) occurring in a non-equilibrium state
- e) No answer is correct.

11. Gas pressure is always directly proportional to:

- a) the square (second power) of mean velocity of gas molecules.
- b) size of gas molecules.
- c) gas thermal conductivity.
- d) specific evaporation heat of the gas.
- e) No answer is correct.

Phase transitions

Glencoe 333 – sample problems + practice problems

Glencoe 339 – consider Section 2 problems

Glencoe 342 – 345 good training, test highly recommended

1. Ice (with initial temperature of $0\text{ }^{\circ}\text{C}$) melted partly in an isolated vessel due to the action of high pressure. As a result of it, the temperature inside the vessel

- a) did not change.
- b) decreased.
- c) increased.
- d) first increased and then decreased.
- e) No answer is correct.

2. A certain amount of snow (with initial temperature of $0\text{ }^{\circ}\text{C}$) was mixed in an isolated vessel with NaCl (of the same temperature) and melted as a result of it. During the melting, the temperature inside the vessel

- a) did not change.
- b) decreased.
- c) increased.
- d) first increased and then decreased.
- e) No answer is correct.

3. Ice was mixed with concentrated solution of urea in a thermally insulated vessel, which resulted in its partial melting. During that, its temperature:

- a) did not change
- b) lowered by several degrees
- c) increased by several degrees
- d) increased at first and then lowered
- e) no answer is correct

4. Which of the following processes can be condensation?

- a) boiler incrustation
- b) formation of sediments on sea bed
- c) formation of kidney stones
- d) when the windowpanes become foggy
- e) no answer is correct

5. Which of the following statements is true?

- a) Evaporating water releases heat.
- b) Water absorbs heat during condensation
- c) Ice absorbs heat during sublimation (evaporation).
- d) Water vapour absorbs heat during condensation.
- e) no answer is correct

6. Which of the following statements is true?

- a) Melting ice absorbs heat.
- b) Freezing water absorbs heat.
- c) Water absorbs heat during condensation.
- d) Melting ice releases heat.
- e) no answer is correct

7. Which of the following processes is a desublimation?

