

Quiz on Learning Prerequisites – Rubber Elasticity

What is the generic name for a cyclical device that transforms heat energy into work?

- ☐ Refrigerator
- ☐ Thermal motor
- ☒ Heat engine
- ☐ Carnot cycle
- ☐ Otto processor

The engine with the largest possible efficiency uses a

- ☐ Brayton cycle.
- ☐ Joule cycle.
- ☒ Carnot cycle.
- ☐ Otto cycle.
- ☐ Diesel cycle

The maximum possible efficiency of a heat engine is determined by

- ☐ its design.
- ☐ the amount of heat that flows.
- ☐ the maximum and minimum pressure.
- ☐ the compression ratio.
- ☒ the maximum and minimum temperature

The Carnot cycle has 2 adiabatic processes and 2 isothermal processes. Choose the statement that best describes why this combination of processes gives the most efficient cycle possible.

- ☐ The adiabatic processes serve to speed up the rate at which each cycle is completed so that it can be used as a practical engine. The isothermal processes serve to minimize the total entropy in the system.
- ☐ By using isothermal expansion/compression, no heat is lost from the system. To minimize the entropy of the system, the temperature of the gas must be kept close to that of the reservoirs during compression/expansion. And this is accomplished via adiabatic processes.
- ☐ The adiabatic processes are used to prevent any heat loss from the system, hence all the heat will be converted to work as efficiently as possible. The isothermal processes do not anything except to provide that means to expand/contract the gas for the adiabatic processes to occur.
- ☒ By using adiabatic expansion/compression, no heat is lost from the system. To minimize the entropy of the system, the temperature of the gas must be kept close to that of the reservoirs during compression/expansion. And this is accomplished via isothermal processes

An adiabatic process is one in which

- ☐ No heat enters or leaves the gas
- ☐ The temperature of the gas changes
- ☐ The change in internal energy is equal to the mechanical workdone
- ☒ All above

According to Gay-Lussac law for a perfect gas, $p/T = \text{constant}$, if v is kept constant.

- ☒ true
- ☐ false

Which of the following statements regarding the Gibbs free energy change for a reaction is false?

- ☒ The Gibbs free energy change is the proportion of the enthalpy change of a reaction that is used to increase the entropy.
- ☐ If the Gibbs free energy change for a reaction is negative, the reaction happens spontaneously.
- ☐ The Gibbs free energy is represented by the symbol G
- ☐ A reaction with a negative Gibbs free energy change of reaction is called an exergonic reaction.

Consider the following thermodynamic properties. Which of these properties are state functions?

- i) work done on a system
- ii) heat absorbed
- iii) entropy
- iv) enthalpy

- ☐ i) and ii) only
- ☐ i) and iii) only
- ☐ i) only
- ☒ iii) and iv) only

What is a thermodynamic potential which measures the “useful” work obtainable from a closed thermodynamic system at a constant temperature and volume?

- ☐ useful work
- ☐ energy consumed
- ☒ Helmholtz free energy
- ☐ Kinetic Energy

What is a thermodynamic potential that measures the “useful” or process-initiating work obtainable from an isothermal, isobaric thermodynamic system?

- ☐ Du-Pont Potential
- ☒ Gibbs free energy
- ☐ Rabz-Eccles Energy
- ☐ Claussius Energy