

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) If a diatomic gas is heated to a very high temperature. How many degrees of freedom are active? 1) _____
A) 3 B) 5 C) 7 D) 9
- 2) A gas has 4 degrees of freedom. Find the adiabatic exponent γ . 2) _____
A) 3 B) $3/2$ C) $3/4$ D) $4/3$
- 3) A thermocycle starts on an isochore towards increasing pressure, followed by adiabatic expansion, and returns to the starting point via an isothermal. Which of the following statements is true? 3) _____
A) The gas does work in this cycle.
B) Work is done on the gas in this cycle.
C) The net work in this cycle is zero.
D) Whether or not work is done by the gas in this cycle depends on the starting point in the P-V plane.
E) Whether or not work is done by the gas depends on the specific heat of the gas.
- 4) If you add some heat to a substance is it possible for the temperature of the substance to remain unchanged? 4) _____
A) Yes. B) No.
- 5) You put 1kg of ice at 0 degree Celsius together with 1kg of steam at 100 degree Celsius. What is the final temperature? 5) _____
A) between 0 degree Celsius and 50 degree Celsius
B) 50 degree Celsius
C) between 50 degree Celsius and 100 degree Celsius
D) 100 degree Celsius
E) greater than 100 degree Celsius
- 6) Two objects are made of the same material, but have different masses and temperatures. If the two objects are brought into thermal contact, which one will have the greater temperature change? 6) _____
A) the one with the higher initial temperature
B) the one with the lower initial temperature
C) the one with the greater mass
D) the one with the smaller mass
E) both have the same temperature change
- 7) A piston-cylinder system arrangement containing 0.60 mol of nitrogen at high pressure is in thermal equilibrium with an ice-water bath containing 200g of ice. The pressure of the ambient air is 1.0 atm. The gas is allowed to expand isothermally until it is in pressure balance with its surroundings. After the process is complete, the batch contains 220g of ice. What was the original gas pressure? ($L_f = 334\text{kJ/kg}$; $L_v = 2257\text{kJ/kg}$ for water; $R = 8.314\text{ J/K}\cdot\text{mol}$) 7) _____
A) 35atm B) 70atm C) 140atm D) 210atm E) 280atm

- 8) A balloon contains 5.0L of air at 0 degree Celsius and 100kPa pressure. How much heat is required to raise the air temperature to 20 degree Celsius, assuming the gas stays in pressure equilibrium with its surroundings? Neglect tension forces in the balloon. The molar specific heat of air at constant volume is $2.5R$. 8) _____
- A) 100 J B) 125 J C) 150 J D) 200 J E) 300 J
- 9) A system has a heat source supplying heat at a rate of 352W and is doing work at a rate of 135W. At what rate is the internal energy of the system changing? 9) _____
- A) 50W B) 100W C) 200W D) 400W
- 10) A piston-cylinder system contains 0.50 mol of hydrogen at 400K and 300kPa. The gas undergoes an expansion that quadruples the system volume. Calculate the work done if the expansion is isothermal. 10) _____
- A) 0.5 kJ B) 1.0 kJ C) 2.0 kJ D) 4.0 kJ E) 8.0 kJ

Answer Key

Testname: QUIZ2

- 1) C
- 2) B
- 3) A
- 4) A
- 5) D
- 6) D
- 7) C
- 8) B
- 9) C
- 10) C