Unit 4 - Week 02 : Thermodynamic Property Relations

Assignment 2

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-08-21, 23:59 IST.

1) Isothermal compressibility is defined as *1 point*

- $-v(\frac{\partial p}{\partial v})_T$
- $v(\frac{\partial p}{\partial v})_T$
- $\frac{1}{v}(\frac{\partial p}{\partial v})_T$
- $-\frac{1}{v}(\frac{\partial p}{\partial v})_T$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$-\frac{1}{v}(\frac{\partial p}{\partial v})_T$

2) For a particular substance, if represents isothermal compressibility and represents volume expansivity, then, among the following relations, which one is true? *1 point*

- $\beta = \alpha(\frac{\partial T}{\partial P})_v$
- $\beta = \alpha(\frac{\partial P}{\partial T})_v$
- $\beta = \alpha(\frac{\partial v}{\partial P})_T$
- $\beta = \alpha(\frac{\partial P}{\partial v})_T$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\beta = \alpha(\frac{\partial P}{\partial T})_v$

3) Consider a sample of air maintained at 300 K and 0.75 kg/m^3. Treating air as an ideal gas with R = 0.287 kJ/kg.K, the change in pressure of the sample for 1% increase in specific volume at constant temperature is *1 point*

- – 2.873 kPa
- – 1.339 kPa
- zero
- 2.873 kPa

No, the answer is incorrect.
Score: 0
Accepted Answers:
– 1.339 kPa

4) A particular gas substance follows the relation, $(p - \frac{a}{v^2})(v - b) = RT$. Using the Maxwell relations, find $(\frac{\partial s}{\partial v})_T$ = *1 point*

- $\frac{R}{v-b}$
- $\frac{aR}{P-a}$
- $\frac{P-a}{v-b}$
- $\frac{R}{b}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{R}{v-b}$

5) Joule-Thomson coefficient for an ideal gas is *1 point*

- positive
- negative
- zero
- undefined

No, the answer is incorrect.
Score: 0
Accepted Answers:
zero

6) A substance can be used as a refrigerant when *1 point*

- its temperature is greater than the maximum inversion temperature and the Joule-Thomson coefficient is positive.
- its temperature is greater than the maximum inversion temperature and the Joule-Thomson coefficient is negative.
- its temperature is lesser than the maximum inversion temperature and the Joule-Thomson coefficient is positive.
- its temperature is lesser than the maximum inversion temperature and the Joule-Thomson coefficient is negative.

No, the answer is incorrect.
Score: 0
Accepted Answers:
its temperature is lesser than the maximum inversion temperature and the Joule-Thomson coefficient is positive.

7) Among the followings, which conclusion can be drawn from the Mayer relation? *1 point*

- Isobaric specific heat is always greater than isochoric specific heat.
- Difference between isobaric and isochoric specific heats vanishes at absolute zero temperature.
- Both specific heats are identical for a purely incompressible substance.
- All of the above.

No, the answer is incorrect.
Score: 0
Accepted Answers:
All of the above.

8) A fixed quantity of Helium at 100 kPa, 293 K, is taken to 600 kPa, 573 K, during a particular process. Helium follows the relation P(v-b) = RT. If, for Helium, $C_p = 5.1926 kJ/kgK$ and $R = 2.0769 kJ/KgK$, then the change in specific entropy during the process (correct to 1 decimal place) is _____ J/kg.K.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) -245,-230

1 point

9) During a particular heating process, temperature of air increases from 20°C to 300°C. Air is found to follow the relation $P(v - b) = RT$. If air can be assumed to have constant value of isochoric specific heat $(C_v) = 0.731 kJ/kgK$, then the change in specific internal energy during the process (correct to 1 decimal place) is _____ kJ/kg.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 202,208

1 point

10) Saturation temperatures for steam at 275 kPa, 300 kPa & 325 kPa are 130.58°C, 133.52°C and 136.27°C, respectively. If the change in specific volume during the phase change process at 300 kPa is 0.60475 m^3/kg, then the enthalpy change associated with this phase change at 300 kPa (correct to 1 decimal place) is _____ kJ/kg.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 2150,2170

1 point