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Courses » Introduction to Chemical Thermodynamics and Kinetics

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## Unit 6 - Week 4

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### Course outline

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## Assignment 4

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2019-02-27, 23:59 IST.**

1) A Carnot engine, working between 600 K and 300 K and using 5 mole of oxygen ( $C_v = 5 \text{ CalK}^{-1}\text{mol}^{-1}$ ) as the working substance, absorbs 1,000 k Cal heat from the hot reservoir. The work done during the adiabatic reversible expansion is (in Cal): **1 point**

- 1,500  
 +4,500  
 -7,500  
 +10,500

**No, the answer is incorrect.****Score: 0****Accepted Answers:****-7,500**

2) Calculate the change in the entropies of the system and the surroundings, and the total change in entropy, when a gas of mass 21.5 g at 300 K and 1.30 bar doubles its volume in an adiabatic reversible expansion **1 point**

- 0, 0, 0  
 10 J K<sup>-1</sup>, -10 J K<sup>-1</sup>, 0  
 1 J K<sup>-1</sup>, -1 J K<sup>-1</sup>, 0  
 100 J K<sup>-1</sup>, -100 J K<sup>-1</sup>, 0

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

3) Calculate the change in the entropies of the system and the surroundings, and the total change in entropy, when a sample of oxygen gas of mass 49.33 g at 298 K and 1.00 bar doubles its volume in an isothermal reversible expansion **1 point**

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**No, the answer is incorrect.****Score: 0****Accepted Answers:** $8.88 \text{ J K}^{-1}, -8.88 \text{ J K}^{-1}, 0$ 

4) A Carnot engine, working between 600 K and 300 K and using 5 mole of oxygen ( $C_v = 5 \text{ Cal K}^{-1} \text{ mol}^{-1}$ ) as the working substance, absorbs 1,000 Cal heat from the hot reservoir. The quantity of heat released to the cold reservoir is (in Cal): **1 point**

- 2,000  
 500  
 1,500  
 1,000

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

500

5) The entropy change when two moles of ideal monoatomic gas is heated from  $100^\circ\text{C}$  to  $200^\circ\text{C}$  reversibly and isochorically is given by **1 point**

- $4.78 \text{ J K}^{-1}$   
  $5.92 \text{ J K}^{-1}$   
  $11.56 \text{ J K}^{-1}$   
  $15.25 \text{ J K}^{-1}$

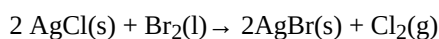
**No, the answer is incorrect.****Score: 0****Accepted Answers:** $5.92 \text{ J K}^{-1}$ 

6) When one mole of an ideal gas is expanded to twice of its initial volume and simultaneously cooled to half of its initial temperature, the change in entropy is **1 point**

- $(C_{v,m} - R) \ln 2$   
  $C_{p,m} \ln 2$   
  $(R - C_{v,m}) \ln 2$   
  $R \ln 2$

**No, the answer is incorrect.****Score: 0****Accepted Answers:** $(R - C_{v,m}) \ln 2$ 

7) Calculate the standard reaction entropy at 298 K of **1 point**



Use the following values

$S_m^\circ (\text{AgBr, s}) = 107.1 \text{ J K}^{-1} \text{ mol}^{-1}$ ,  $S_m^\circ (\text{Cl}_2, \text{g}) = 223.07 \text{ J K}^{-1} \text{ mol}^{-1}$ ,  $S_m^\circ (\text{AgCl, s}) = 96.2 \text{ J K}^{-1} \text{ mol}^{-1}$ ,  $S_m^\circ (\text{Br}_2, \text{l}) = 152.23 \text{ J K}^{-1} \text{ mol}^{-1}$

- $92.6 \text{ J K}^{-1} \text{ mol}^{-1}$   
  $22.6 \text{ J K}^{-1} \text{ mol}^{-1}$   
  $52.6 \text{ J K}^{-1} \text{ mol}^{-1}$


72.6 J K<sup>-1</sup> mol<sup>-1</sup>


No, the answer is incorrect.


Score: 0


Accepted Answers:


92.6 J K<sup>-1</sup> mol<sup>-1</sup>

8) Calculate the minimum work needed to prepare 1 kg ice from water at 25<sup>0</sup>C in a **1 point** refrigerator working between 5<sup>0</sup>C and 25<sup>0</sup>C. 

11754.17 calories 

11.17 calories 

154.17 calories 

117.17 calories 

No, the answer is incorrect.

Score: 0 

Accepted Answers:

11754.17 calories

9) A 1000 Watt electric heater attaining 800 K temperature instantaneously is kept **1 point** on for 10 mins in a room of temperature 27<sup>0</sup>C. Calculate change in entropy of universe

1250 J K<sup>-1</sup>

2 J K<sup>-1</sup>

10 J K<sup>-1</sup>

25 J K<sup>-1</sup>

No, the answer is incorrect.

Score: 0

Accepted Answers:

1250 J K<sup>-1</sup>

10) An engine working between 600 K and 300 K extracts 10<sup>5</sup> kJ of heat. The **1 point** inventor claims that the engine is a 1kW engine. So how long the engine will work with the supplied heat.

50000 seconds

2 seconds

5 seconds

10 seconds

No, the answer is incorrect.

Score: 0

Accepted Answers:

50000 seconds

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