PHYS 2C

Discussion Section – 1/29

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Before we Begin:

- Try and **sit next to a student you don't know**
- Introduce yourselves and find out where the other student is from
- Plan for today: 2 problems on Thermodynamics (Ch 18)
  - 1 problem – 2 parts – Past Practice Exam
  - 1 problem – 3 parts – Ideal Gas and pv Diagram

Discussion Problem 1 – Part A

Water heated in Microwave (Past Practice Exam Problem)

A microwave can heat up 1 cup of water (237mL) from room temperature (20◦C) to 80◦C in 90 seconds.

Recall the specific heat of water is 4.19 kJ/(kg · K), the latent heat of fusion is 333 kJ/kg, and the latent heat of vaporization is 2260 kJ/kg.

a)   What is the power delivered to the water?

Discussion Problem 1 – Part A - Solution

Water heated in Microwave (Past Practice Exam Problem)

A microwave can heat up 1 cup of water (237mL) from room temperature (20◦C) to 80◦C in 90 seconds.

Recall the specific heat of water is 4.19 kJ/(kg · K), the latent heat of fusion is 333 kJ/kg, and the latent heat of vaporization is 2260 kJ/kg.

a)   What is the power delivered to the water?

   660 W

Discussion Problem 1 – Part B

Water heated in Microwave (Past Practice Exam Problem)

A microwave can heat up 1 cup of water (237mL) from room temperature (20◦C) to 80◦C in 90 seconds.

Recall the specific heat of water is 4.19 kJ/(kg · K), the latent heat of fusion is 333 kJ/kg, and the latent heat of vaporization is 2260 kJ/kg.

b) Assuming the same rate of power delivered to the water, how much additional time would it take to completely boil all of the water?

Discussion Problem 1 – Part B - Solution

Water heated in Microwave (Past Practice Exam Problem)

A microwave can heat up 1 cup of water (237mL) from room temperature (20◦C) to 80◦C in 90 seconds.

Recall the specific heat of water is 4.19 kJ/(kg · K), the latent heat of fusion is 333 kJ/kg, and the latent heat of vaporization is 2260 kJ/kg.

b) Assuming the same rate of power delivered to the water, how much additional time would it take to completely boil all of the water?
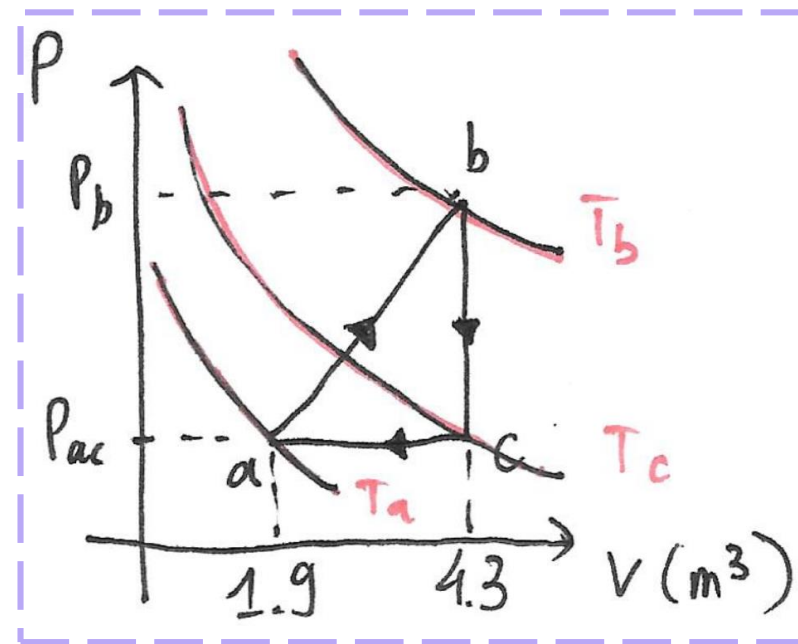**14 minutes**

Discussion Problem 2

Ideal Gas and pv Diagram

A sample of an ideal gas is taken through a cyclic process $abca$ shown in the figure.

The scale of the vertical axis is set by $p_b = 7.36 \, kPa$ and $p_a = 6.44 \, kPa$. At point a, T_a = 207K

a) How many moles of gas are in the sample?
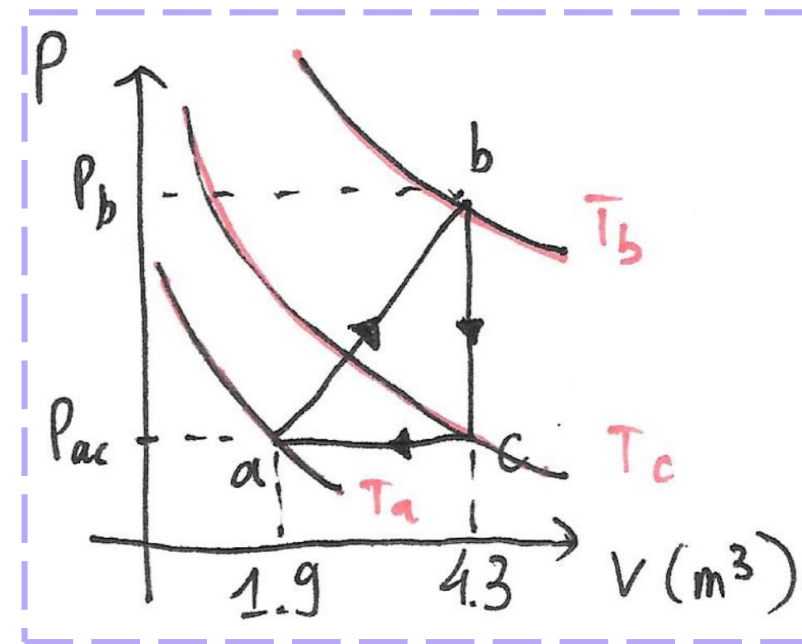
b) What is T_b?

c) What is T_c?

Discussion Problem 2 - Solution

Ideal Gas and pv Diagram

A sample of an ideal gas is taken through a cyclic process $abca$ shown in the figure.

The scale of the vertical axis is set by $p_b = 7.36 \ kPa$ and $p_a = 6.44 \ kPa$. At point a, T_a = 207K

a) How many moles of gas are in the sample? – **7.11 moles**

b) What is T_b? – **535.4 K**

c) What is T_c? – **468.5 K**