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Courses » Fundamentals of Combustion (Part 2)

Announcements **Course** Ask a Question Progress Mentor FAQ

Unit 3 - Week 2: Laminar Premixed Flames and Burning Velocity

Course outline

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Week 1:
Introduction to Flame and One dimensional Combustion Wave Analysis

Week 2: Laminar Premixed Flames and Burning Velocity

Lecture 6: Laminar Flame Theory for Premixed Flames

Lecture 7: Laminar Flame Theory for Premixed Flames (Contd..)

Lecture 8: Determination of Laminar Burning Velocity for Premixed Flames

Lecture 9: Flame Thickness and Burning

Week 2 : Assignment

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2018-09-05, 23:59 IST.**

1) Consider these statements in reference to laminar burning velocity 1 point
 I. It depends on air/fuel ratio.
 II. Type of fuel oxidizer doesn't affect burning velocity
 III. It doesn't depend on initial temperature.

Which statement/s is/are true :

- I, II and III
 Only I
 I and II
 I and III

No, the answer is incorrect.

Score: 0

Accepted Answers:

Only I

2) Identify the correct statement 1 point

- Flame thickness doesn't depend on fuel-air mixture.
 Flame thickness increases with decrease in laminar burning velocity.
 Flame thickness decreases with increase in thermal diffusivity.
 None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

Flame thickness increases with decrease in laminar burning velocity.

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Quiz : Week 2 : Assignment

WEEK 2 - FEEDBACK - Fundamentals of Combustion (Part 2)

Week 3: Effects of Physical and Chemical Variables on Burning Velocity, Flame Extinction, Ignition and Stabilization

Week 4: Introduction to Turbulent Premixed Flames and Diffusion Flames

Week 5: Diffusion Flame and Introduction to Droplet Combustion

Week 6: Droplet and Spray Combustion

Week 7: Solid Fuel Combustion

Week 8: Combustion and Environment

None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:
Soap Bubble Method

4) Which of following visualization techniques is preferred most for locating the flame surface **1 point**

- Luminous photography
 Shadowgraph photography
 Schlieren photography
 None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:
Schlieren photography

5) Consider the following statements regarding laminar flame theory **1 point**

- I. It is valid for steady as well as for unsteady flow.
II. Momentum equation can be neglected.
III. It is valid only for inviscid flow.
IV. Fourier and Fick's law are valid.

Which statement/s is/are true

- I , II and IV
 II, III and IV
 III and IV
 Only III

No, the answer is incorrect.

Score: 0

Accepted Answers:
II, III and IV

6) A conical flame of flame height h is established to determine laminar burning velocity of stoichiometric CH_4 - air mixture using a Bunsen burner with port diameter of 12mm. If it consumes 20 liter per min of fuel -air mixture and burning velocity is measured as 40 cm/s then the value of h is **3 points**

- 4.38 cm
 5.67 cm
 3.23 cm
 7.88 cm

No, the answer is incorrect.

Score: 0

Accepted Answers:
4.38 cm

7) Flame speed of lean CH_4 -air mixture ($\phi=0.6$) at 298 K, 1 atm. (Take reaction rate of CH_4 **4 points**

$$r_{\text{CH}_4} = 3 \times 10^{10} \exp(-E/R_u T) [\text{C}_{\text{CH}_4}]^{-0.3} [\text{CO}_2]^{2.5}$$

where $E/R_u = 15000$ E in kcal/gmol, and $T_{\text{ad}} = 2300$ K. specific heat $C_p = 1275$ J/kgK and thermal conductivity $K = 0.115$ W/mK)

- 35.5 cm/s
- 77.2 cm/s
- 58.6 cm/s
- 110.4 cm/s

No, the answer is incorrect.

Score: 0

Accepted Answers:

77.2 cm/s

8) Spherical laminar flames initiated from the centre of a big vessel propagate through stoichiometric methane -air mixture maintained at 1 bar and 300 K. Hot products inside the spherical flame are at 2.2 bar and 2100 K. Spherical flame is time varying and measured as $r(\text{cm})=130t-0.5$. The laminar burning velocity for the product **3 points**

- 34.83 cm/s
- 40.85 cm/s
- 45.87 cm/s
- 56.50 cm/s

No, the answer is incorrect.

Score: 0

Accepted Answers:

40.85 cm/s

9) A premixed CH_4 -air mixture emerges from a round nozzle with uniform velocity of 60 cm/s. The laminar flame speed of the CH_4 -air mixture is 40 cm/s. The cone angle of this flame is **2.5 points**

- 30 degree
- 52.5 degree
- 41.8 degree
- 58.6 degree

No, the answer is incorrect.

Score: 0

Accepted Answers:

41.8 degree

10) For a laminar premixed flame, the unburned mixture temperature and film temperature are 300 K and 2100 K respectively. The temperature profile at inflection point is given as $T(x)=2.5 \cdot 10^6 x-223$. The flame thickness and laminar burning velocity for the product are: (Thermal diffusivity = $1.38 \cdot 10^{-5} \text{ m}^2/\text{s}$) **2.5 points**

- 4.24 mm and 1.38 cm/s
- 2.00 mm and 1.65 cm/s
- 1.00 mm and 2.14 cm/s
- 0.72 mm and 2.55 cm/s

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.72 mm and 2.55 cm/s

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