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Courses » Fundamentals of Combustion (Part 2)

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

Unit 2 - Week 1: Introduction to Flame and One dimensional Combustion Wave Analysis

Course outline

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

Lecture 1: Combustion Modes and Classification of Flames

Lecture 2: Analysis of One Dimensional Combustion Wave

Lecture 3: Analysis of One Dimensional Combustion Wave (Contd..)

Lecture 4: Introduction to Laminar Premixed Flame

Lecture 5: Structure of One Dimensional Premixed

Week 1 : Assignment

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2018-08-22, 23:59 IST.**

1) Spray combustion is an example of 1 point

- Premixed flame
- Partially premixed flame
- Diffusion flame

No, the answer is incorrect.

Score: 0

Accepted Answers:
Diffusion flame

2) In laminar premixed flame, the zone where unburned gases are heated to the critical temperature is 1 point

- Dark zone
- Luminous zone
- Region above the luminous zone where burned gases interact with surrounding

No, the answer is incorrect.

Score: 0

Accepted Answers:
Dark zone

3) In laminar premixed flame, the zone where maximum temperature occurs is 1 point

- Dark zone
- Luminous zone

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of Combustion
(Part 2)Week 2: Laminar
Premixed
Flames and
Burning VelocityWeek 3: Effects
of Physical and
Chemical
Variables on
Burning Velocity,
Flame
Extinction,
Ignition and
StabilizationWeek 4:
Introduction to
Turbulent
Premixed
Flames and
Diffusion FlamesWeek 5:
Diffusion Flame
and Introduction
to Droplet
CombustionWeek 6: Droplet
and Spray
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Combustion and
Environment

- This relation is valid for steady as well as unsteady state conditions.
- Shear force and body force may be there may not be there.
- This relation is valid for real gas as well as for ideal gas.
- None of the above statement is true in reference to Rankine - Hugoniot relation

No, the answer is incorrect.**Score: 0****Accepted Answers:***None of the above statement is true in reference to Rankine - Hugoniot relation*5) Which statement is true for combustion wave speed 1 point

- Speed depends on equivalence ratio and type of fuel -air mixture .
- Speed does not depends on equivalence ratio but depends on type of fuel -air mixture .
- Speed depends on equivalence ratio but does not depend on type of fuel -air mixture.
- None of these

No, the answer is incorrect.**Score: 0****Accepted Answers:***Speed depends on equivalence ratio and type of fuel -air mixture .*6) Statement 1. The color of flame for a fuel lean mixture is blue and for a fuel rich mixture is yellow. 2.5 pointsStatement 2. Blue color occurs in flame due to excitation of C_2^* molecules and yellow color occurs due to excitation of OH^* radicals.

- Statement 1 is correct. Statement 2 is correct. Statement 2 is correct explanation of 1.
- Statement 1 is correct. Statement 2 is correct. But Statement 2 is not correct explanation of 1.
- Statement 1 is correct. Statement 2 is incorrect.
- Statement 1 is incorrect. Statement 2 is correct.

No, the answer is incorrect.**Score: 0****Accepted Answers:***Statement 1 is correct. Statement 2 is incorrect.*7) A detonation wave is travelling which density ratio across the wave is 3 . 2.5 points
The pressure at the upstream and downstream are 0.2 MPa and 2.22 MPa respectively.
Mach number at upstream and downstream if the specific heat ratio is 1.3

- 4.38 and 0.67
- 1.89 and 0.34
- 2.41 and 0.43
- 3.41 and 0.59

No, the answer is incorrect.**Score: 0****Accepted Answers:***3.41 and 0.59*1.8) For one -dimensional laminar premixed flame 2.5 points

Statement 1. Reaction zone is where most of the chemical reactions and decomposition of molecules take place .

Statement 2. Reaction zone is very thick compare to preheated zone.

Statement 3. Large temperature and concentration gradient occur in recombination zone.

Correct statement/s is/are

- 1,2 and 3
- 1 and 2
- only 1
- 1 and 3

No, the answer is incorrect.

Score: 0

Accepted Answers:

only 1

9) In a tube, detonation wave is established in such a way that density ratio across the wave is 3. Upstream pressure, temperature and downstream pressure are 0.1 MPa, 300K and 1.1 MPa respectively. Then the mass flux and velocity at upstream are (MW=23 g/mol & specific heat ratio=1.2) **3 points**

- 1176 kg/s.m² and 1275 m/s
- 1378 kg/s.m² and 1500 m/s
- 1664 kg/s.m² and 1728 m/s
- 1265 kg/s.m² and 1400 m/s

No, the answer is incorrect.

Score: 0

Accepted Answers:

1176 kg/s.m² and 1275 m/s

10) The velocity at which detonation is moving in a stoichiometric propane-air mixture (molar specific heat of C₃H₈ is 73.89 kJ/kmol.K and consider product at 3500 K ,C_p(O₂)=29.315 kJ/kmol.K, C_p(N₂)=29.071 kJ/kmol.K (reactant side), C_p(CO₂)=62.718 kJ/kmol.K, C_p(H₂O)=57.076 kJ/kmol.K , C_p(N₂)=37.302 kJ/kmol.K (product side), heat of formation h_f (C₃H₈)=-2360 kJ/Kg, h_f (CO₂)=-8942 kJ/Kg, h_f (H₂O)=-13424 kJ/Kg) **4 points**

- 1575 m/s
- 1665 m/s
- 1870 m/s
- 2032 m/s

No, the answer is incorrect.

Score: 0

Accepted Answers:

1870 m/s

11) Two mixtures (X and Y) will propagate a detonation wave under the appropriate conditions: **2.5 points**

X : H₂ + (0.21 O₂ + 0.79 N₂)

Y : H₂ + (0.21 O₂ + 0.79 Ar)

Which statement is true for given conditions

- X will have higher detonation velocity compare to Y.
- Y will have higher detonation velocity compare to X.

- Both X and Y will have same detonation velocity
- None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

X will have higher detonation velocity compare to Y.

12A detonation wave is travelling at a upstream speed of 2000 m/s and the density ratio across the wave is 2.2. The pressure and temperature at the upstream of wave is 0.1 MPa and 300K. Assume the ideal gas with specific heat ratio and mixture molecular weight are 1.3 and 28 kg/kmol. Then the chemical heat released per unit mass **3 points**

- 2.5 kJ/g
- 5.6 kJ/g
- 8.7 kJ/g
- 13.2 kJ/g

No, the answer is incorrect.

Score: 0

Accepted Answers:

2.5 kJ/g

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