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Courses » Fundamentals of Combustion (Part 2)

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Unit 4 - Week 3: Effects of Physical and Chemical Variables on Burning Velocity, Flame Extinction, Ignition and Stabilization

Course outline

How to access the portal

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

Week 2: Laminar Premixed Flames and Burning Velocity

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

Lecture 11: Effects of Chemical and Physical Variables on Burning Velocity

Lecture 12: Effects of

Week 3 : 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 the following statements in reference of inert gas additives **1 point**

- i) It reduces the burning velocity
- ii) It increases the burning velocity
- iii) It affects the ratio of thermal conductivity and specific heat.
- iv) It does not affect the ratio of thermal conductivity and specific heat.

Choose the correct option having correct statement/s

- i) and iii)
- ii) and iv)
- i) and iv)
- ii) and iii)

No, the answer is incorrect.

Score: 0

Accepted Answers:

i) and iii)

2) Burning velocity always decreases with increase in pressure. Given statement is : **1 point**

- True
- False

No, the answer is incorrect.

Score: 0

Accepted Answers:

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Funded by

Additives on
Burning
Velocity and
Flame
Extinction

Lecture 14:
Simplified
Analysis for
Quenching
Diameter

Lecture 15:
Flammability
Limits and
Flame
Stabilization

Quiz : Week 3 :
Assignment

WEEK 3 -
FEEDBACK -
Fundamentals
of Combustion
(Part 2)

**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**

No, the answer is incorrect.

Score: 0

Accepted Answers:

Increases the quenching diameter

4) In most of the cases, flame flashback occurs when

1 point

- Velocity gradient is quite large
 Velocity gradient is quite small
 Velocity gradient is 0.

No, the answer is incorrect.

Score: 0

Accepted Answers:

Velocity gradient is quite small

5) By some mean, thermal diffusivity of burned gases is halved and burning velocity is doubled . Then quenching diameter will become

1 point

- Half of the initial diameter
 Double of the initial diameter
 $\frac{1}{4}$ of initial diameter
 4 times of initial diameter

No, the answer is incorrect.

Score: 0

Accepted Answers:

$\frac{1}{4}$ of initial diameter

6) In a stoichiometric ethylene and air flame N_2 is replaced by Ar , whose original burning velocity is 50 m/s . New burning velocity after inert gas replacement ($MW_{Ar}=40$ gm/mol)

3 points

- 38.18 m/s
 46.64 m/s
 58.50 m/s
 64.78 m/s

No, the answer is incorrect.

Score: 0

Accepted Answers:

38.18 m/s

7) Methane gas is leaking from a tank in a 3m X 4m X 5m room with mass flow rate of 0.5 kg/s at 20C and 1 atm. The air and fuel in the room are well mixed after a sufficient time.

3 points

Consider the following statement regarding equivalence ratio and flammability and choose the correct option (take $0.45 < \phi < 1.64$ for flammability)

- .6 and mixture is flammable
 .12 and mixture is not flammable
 .68 and mixture is not flammable
 .28 and mixture is not flammable

No, the answer is incorrect.

Score: 0

Accepted Answers:

.12 and mixture is not flammable

8) Laminar flame speed for octane air flame ($\phi=0.8$) at 800K and 1.2 MPa 3 points
using Metghalchi and Keck empirical relation

(Take $SL_r = SL_{r}(T_u/T_{u,r})^Y (P/P_r)^\beta$, $Y=2.18-0.8(\phi-1)$,
 $\beta=-0.16+0.22(\phi-1)$ $SL_{r,r}=26.32-84.72(\phi-1.13)^2$ cm/s, $T_{u,r}=298$ K, $P_r=1$ atm)

- 40 cm/s
- 57 cm/s
- 78 cm/s
- 94 cm/s

No, the answer is incorrect.

Score: 0

Accepted Answers:

94 cm/s

9) For a laminar premixed flame, the unburned mixture 3 points
temperature and film temperature are 300 K and 2100 K respectively.

The temperature profile at inflection point is given as

$T(x)=2.5 \cdot 10^5 x - 223$. Then the quenching diameter is (Take $C=2$)

- 20.3 mm
- 15.6 mm
- 28.8 mm
- 32.2 mm

No, the answer is incorrect.

Score: 0

Accepted Answers:

28.8 mm

10) If the fuel consisting of 60% CH_4 , 20% C_2H_6 and 20% C_3H_8 , then RFL and 3 points
UFL limit of the mixture fuel oxidizer by LC Rule (in %)

- 3.49 and 12.80
- 5.62 and 15.59
- 7.82 and 18.16
- 9.64 and 21.56

No, the answer is incorrect.

Score: 0

Accepted Answers:

3.49 and 12.80

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