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Courses » Fundamentals of Combustion (Part 2)

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

Unit 6 - Week 5: Diffusion Flame and Introduction to Droplet Combustion

Course outline

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Week 1: Introduction to Flame and One dimentional Combution 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

Week 4: Introduction to Turbulent Premixed Flames and Diffusion Flames

Week 5: Diffusion Flame and Introduction to Droplet

Week 5: Assignment

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment. **Due on 2018-09-12, 23:59 IST.**

1) Under normal gravity condition, the shape of flame front is spherical. Following statement is *1 point*

- True
- False

No, the answer is incorrect.
Score: 0

Accepted Answers:
False

2) Choose the correct option showing correct trend of soot formation *1 point*

- Alkanes > alkenes > alkynes >aromatic
- Aromatic> alkanes > alkenes > alkynes
- Aromatic> alkenes > alkynes > alkanes
- Aromatic> alkynes > alkenes > alkanes

No, the answer is incorrect.
Score: 0

Accepted Answers:
Alkanes > alkenes > alkynes >aromatic

3) Turbulent diffusion flames produce more noise and more soot in comparison to laminar diffusion flame. Following statement is *1 point*

- True
- False

formed in presence of excess air while in case of insufficient air, formation of under-ventilated flame takes place.
Statement 2. In case of normal jet diffusion flame, the flame boundary converges towards the axis in presence of excess air hence cause to form over-ventilated and in presence of insufficient air flame surface expands towards outer wall resulting in formation of under-ventilated flame.

- 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 correct. Statement 2 is correct explanation of 1.

5) A normal jet diffusion flame of propane fuel is issued from a tube of diameter 8 cm with velocity of 0.5 cm/s. (Mixture is at *300 K* and *1 atm* , T_{ad}=*2200K* and ΔH_c=*45,000 kJ/kg*, k_g=*.017 W/mK*,C_p=*1.63 kJ/kg.K*) ***4 points***
The flame height and heat released rate calculated using empirical relation from experimental data are:

- 10.2 cm and 0.5 kW
- 24.5 cm and 1.4 kW
- 53.8 cm and 2.0 kW
- 90.0 cm and 2.6 kW

No, the answer is incorrect.
Score: 0

Accepted Answers:
53.8 cm and 2.0 kW

6) A laminar ethane gas jet is released from a circular port of diameter 10 mm with initial velocity of 10 cm/s. The flame height for ethane is calculated to be 50 cm using Rooper model. If the flow is at 300 K, then the value of mean diffusion coefficient and flame height using experimental data are (T_{ad}=*2200 K*) ***4 points***

- 5.42×10^{-6} m^2/s and 17.2 cm
- 3.86×10^{-6} m^2/s and 32.4 cm
- 1.38×10^{-5} m^2/s and 17.2 cm
- 5.42×10^{-6} m^2/s and 32.4 cm

No, the answer is incorrect.
Score: 0

Accepted Answers:
5.42×10^{-6} m^2/s and 17.2 cm

7) Methane gas is issued from a tube of 10 mm diameter at 300 K and 1 atm. The flame height is calculated to be 0.7 m using phenomenological analysis; the flow rate of methane gas is (*Kg = 0.031 W/mK, Cp=2220 J/Kg.K*) ***3 points***

- 3.8 lpm
- 5.7 lpm

- 7.8 lpm
- 9.4 lpm

No, the answer is incorrect.
Score: 0

Accepted Answers:
5.7 lpm

8) A butane jet is issued from a circular port to ambient condition with heat release rate of *1kW*. The volume flow rate and flame height flame using empirical relation from experimental data are: (ΔH_f=*45000 kJ/kg*) **3 points**

- 1.82×10^{-6} m^3/s and 38.9 cm
- 3.64×10^{-6} m^3/s and 38.9 cm
- 7.28×10^{-6} m^3/s and 57.4 cm
- 9.37×10^{-6} m^3/s and 19.8 cm

No, the answer is incorrect.
Score: 0

Accepted Answers:
9.37×10^{-6} m^3/s and 19.8 cm

9) If the fuel tube diameter for a jet diffusion flame is reduced by 20% and velocity is increased by 20%; Then the new flame height using empirical relation from experimental data will: **3 points**

- Increase by 11%
- Decrease by 23%
- Increase by 20%
- Increase by 28%

No, the answer is incorrect.
Score: 0

Accepted Answers:
Decrease by 23%

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