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Courses » Fundamentals of Combustion (Part 2)

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Unit 8 - Week 7: Solid Fuel Combustion

Course outline

How to access the portal

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 Combustion

Week 7: Assignment

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-09-26, 23:59 IST.

1) Pyrolysis of solid fuel is *1 point*

- surface process
- volumetric process
- none of these

No, the answer is incorrect.
Score: 0

Accepted Answers:
volumetric process

2) In kinetically controlled regime, burning rate of solid fuel is independent of particle size. This statement is: *1 point*

- True
- False

No, the answer is incorrect.
Score: 0

Accepted Answers:
True

3) Choose the correct option regarding diffusion regime of solid fuel combustion *1 point*

- Burning rate increases with increase in particle size.
- Burning rate increases with decrease in particle size.
- Burning rate is independent of particle size.

No, the answer is incorrect.
Score: 0

- mass fraction of oxidizer at the surface of the carbon sphere is nearly 0.5.
- none of these

No, the answer is incorrect.
Score: 0

Accepted Answers:
mass fraction of oxidizer at the surface of the carbon sphere is almost zero.

5) Carbon and metal combustion process is predominantly: ***1 point***

- Diffusion controlled
- Kinetically controlled

No, the answer is incorrect.
Score: 0

Accepted Answers:
Diffusion controlled

6) A carbon particle of diameter 80 µm is burnt in air. The burning time of the particle is: ***3 points***
Consider mean molecular weight and temperature at the surface are 30 kg/kmol and 1800 K respectively. Assume mass transfer number is 0.175 and density of carbon particles is 1800 kg/m^3 (at 393 K, mass diffusivity D=1.6×10^{-5} m^2/s)

- 0.20 sec
- 0.28 sec
- 0.36 sec
- 0.44 sec

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.28 sec

7) Ratio of surface temperature Ts obtained, when carbon spherical particle is burnt in presence of air (T_{inf}=300 K) ***3 points***
i) and produces CO (f=12/16, ΔHc=8.4 MJ/kg and Cp=1.148 kJ/kg)
ii) and produces CO_2 (f=12/32, ΔHc=30.5MJ/kg and Cp=1.148 kJ/kg)

- 0.57
- 0.68
- 1.35
- 1.75

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.57

8) The ratio of oxygen mass fraction at r=35 µm when a 70 µm carbon particle is burnt ***3 points***
i) In presence of air
ii) In presence of pure oxygen

- 1.21
- 0.65
- 0.25

- 1.35

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.25

9) Oxygen mass fraction at r=35 µm when a 70 µm carbon particle is burning at a rate of 0.02 kg/m^2.s in presence of pure oxygen and producing CO_2 at 1 atm. (consider particle temperature =1800 K and diffusion coefficient =7×10^{-5} m^2/s, mean molecular weight of the gases is 30 kg/kmol) ***3 points***

- 0.335
- 0.185
- 0.500
- 0.665

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.335

10) Ratio of burning time of two different solid fuels of diameter 80 µm and 160 µm having transfer number of 4 and 8 respectively. (assume same density and diffusion number for both fuels) ***3 points***

- 0.48
- 2.94
- 0.34
- 1.67

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.34

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