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
   - 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:
   - True
   - False

   No, the answer is incorrect.
   Score: 0
   Accepted Answers: True

3) Choose the correct option regarding diffusion regime of solid fuel combustion
   - 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
5) Carbon and metal combustion process is predominantly:

- 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:
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/m³ (at 393 K, mass diffusivity D=1.6×10⁻⁵ m²/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)
i) and produces CO (f=12/16, ΔHc=8.4 MJ/kg and Cp=1.148 kJ/kg)
ii) and produces CO₂ (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
i) In presence of air
ii) In presence of pure oxygen

- 1.21
- 0.65
- 0.25

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.57
9) Oxygen mass fraction at \( r = 35 \, \mu m \) when a 70 \( \mu m \) 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 =\( 7 \times 10^{-5} \, m^2/s \), mean molecular weight of the gases is 30 kg/kmol)

- 0.335
- 0.185
- 0.500
- 0.665

No, the answer is incorrect.
Score: 0
Accepted Answers: 0.25

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

- 0.48
- 2.94
- 0.34
- 1.67

No, the answer is incorrect.
Score: 0
Accepted Answers: 0.34