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NPTEL

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Courses » Fundamentals Of Combustion (Part 1)

Announcements Course Ask a Question Progress Mentor

Unit 7 - Week 6 : Types of reaction and Introduction to Physics of combustion

Course outline

How to access
the portal?

Week 1 :
Introduction to
Combustion

Week 2 :
Thermodynamics
of combustion

Week 3 :
Thermochemistry

Week 4 :
Chemical
Equilibrium and
Kinetics

Week 5 :
Chemical
Kinetics

Week 6 : Types
of reaction and
Introduction to
Physics of
combustion

- Lecture 26
Classification of
chemical
reactions
- Lecture 27
Elementary
chain reactions
- Lecture 28
Quasi-steady
state and partial
equilibrium
approximation
- Lecture 29
Physics of
combustion

Week 6 Assessment 6

The due date for submitting this assignment has passed. **Due on 2018-03-21, 23:59 IST.**

Submitted assignment

1) In Chain propagation reactions, 1 point

- consumes and produce the same number of radicals in reactant and product side
- there a net production of radicals in reactant side
- there is a reduction in the number of radicals produced
- stable molecules are produced

No, the answer is incorrect.

Score: 0

Accepted Answers:

consumes and produce the same number of radicals in reactant and product side

2) In chain terminating reaction, 1 point

- there is a net destruction of radicals
- final products are formed consuming radicals
- the ratio of free radicals in product and reactant is equal to unity
- both (a) and (b)

No, the answer is incorrect.

Score: 0

Accepted Answers:

both (a) and (b)

3) The unit of diffusion coefficient is 1 point

- m^2
- m^2s
- m^2/s
- s^{-1}

No, the answer is incorrect.

Score: 0

Accepted Answers:

m^2/s

4) Which of the following dimensionless number is unity when temperature and mass diffusivity profiles are identical, 1 point

- Lewis number

Lecture 30
Transport equations and molecular model for transport process

Quiz : Week 6
Assessment 6

Week 6
Assessment 6
Solutions

Week 6
Feedback

**Week 7 :
Transport
Phenomena**

**Week 8 :
Conservation
Equations**

- Prandtl number
 Schmidt number
 None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Lewis number

5) The dimensionless number connecting thermal and momentum diffusivity is, **1 point**

- Lewis number
 Prandtl number
 Schmidt number
 None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Prandtl number

6) The length, diameter and the surface temperature of a steam pipeline is 30m, 0.1m and **1 point** 120°C respectively. The ambient temperature is at 30°C with associated convection coefficient, emissivity to be 10 W/m² and 0.8 respectively. The heat loss through convection in kW is

- 6.5
 7.5
 8.5
 9.5

No, the answer is incorrect.

Score: 0

Accepted Answers:

8.5

7) The length, diameter and the surface temperature of a steam pipeline is 30m, 0.1m and **1 point** 120°C respectively. The ambient temperature is at 30°C with associated convection coefficient, emissivity to be 10 W/m² and 0.8 respectively. The heat loss through radiation in kW is

- 4.6
 5.6
 6.6
 7.6

No, the answer is incorrect.

Score: 0

Accepted Answers:

6.6

8) Which of the following statement is right in regard to thermal explosion phenomenon **1 point**

- Heat liberated during initial slow reactions is accumulated due to insufficient heat loss to the surrounding
 Chain carrying radicals are formed during thermal explosion
 The chain carrying radicals get accumulated in the system due to insufficient diffusion loss
 None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

Heat liberated during initial slow reactions is accumulated due to insufficient heat loss to the surrounding

9) When the pressure is increased, the viscosity of a fluid **1 point**

- Increases
- Decreases
- No effect
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Increases

10) The shear stress distribution for a fluid flowing in between 2 parallel plates at rest separated by a distance is **1 point**

- Zero at the midpoint and varies linearly with distance
- Maximum at the midplane and varies linearly with distance
- Zero at the plates and varies exponentially to mid-point
- Constant over the cross-section

No, the answer is incorrect.

Score: 0

Accepted Answers:

Zero at the midpoint and varies linearly with distance

11) The factor used to take care reaction probability depending on the certain mutual orientations of the reactant molecules is called **1 point**

- Pre-exponential factor
- Steric factor
- Activation energy
- Probability factor

No, the answer is incorrect.

Score: 0

Accepted Answers:

Steric factor

12) Partial equilibrium approximation is applied to eliminate **1 point**

- Reactions having short time of existence
- Species attaining steady state
- Reactive intermediate species
- None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

Reactions having short time of existence

13 **0 points**

$$\text{Br}_2 + \text{M} \xrightarrow{k_1} 2 \text{Br} + \text{M} \text{ (R.1)}$$

$$\text{Br} + \text{H}_2 \xrightarrow{k_2} \text{HBr} + \text{H} \text{ (R.2)}$$

$$\text{H} + \text{Br}_2 \xrightarrow{k_3} \text{HBr} + \text{Br} \text{ (R.3)}$$

$$\text{Br} + \text{Br} + \text{M} \xrightarrow{k_4} \text{Br}_2 + \text{M} \text{ (R.4)}$$

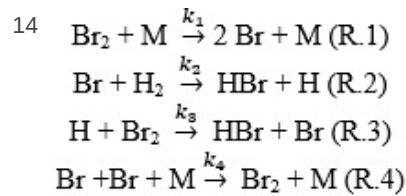
For the above set of reactions, the chain carrying reaction is/are

- R.1
- R.2
- R.1 and R.2
- R.3 and R.4

No, the answer is incorrect.

Score: 0

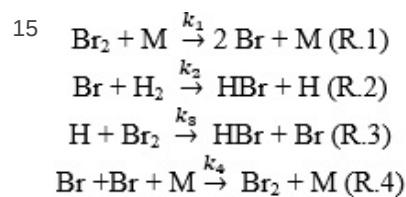
Accepted Answers:

R.1 and R.2

1 point

For the above set of reactions, the chain initiation reaction is/are

- R.1
- R.2
- R.1 and R.2
- R.3 and R.4

No, the answer is incorrect.**Score: 0****Accepted Answers:***R.1*

1 point

For the above set of reactions, the chain terminating reaction is/are

- R.3
- R.4
- R.3 and R.4
- Insufficient data

No, the answer is incorrect.**Score: 0****Accepted Answers:***R.4*

16)The quasi-steady-state assumption applies to:

1 point

- Specific species and not chemical reactions
- Generally assumed for minor species
- Usually applied to species with instantaneous formation and destruction rates
- All of these

No, the answer is incorrect.**Score: 0****Accepted Answers:***All of these*17)The simplified form of hydrogen radical concentration for the above set of reactions from R.1 to R.4 in terms of C_{H_2} , C_{Br} , C_{Br_2} and C_{HBr} by applying steady-state approximation to C_{H} , C_{Br} is, **4 points**

- $$[\text{H}] = \frac{k_2[\text{Br}][\text{H}_2]}{k_3[\text{Br}_2] + k_4[\text{HBr}]}$$
- $$[\text{H}] = \frac{k_3[\text{Br}][\text{H}_2]}{k_3[\text{Br}_2] + k_4[\text{HBr}]}$$
- $$[\text{H}] = \frac{k_2[\text{Br}][\text{H}_2]}{k_3[\text{Br}_2] + k_2[\text{HBr}]}$$

$$[H] = \frac{k_1[Br][H_2]}{k_3[Br_2] + k_4[HBr]}$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$[H] = \frac{k_2[Br][H_2]}{k_3[Br_2] + k_4[HBr]}$$

Previous Page

End

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