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Courses » Fundamentals Of Combustion (Part 1)

Announcements Course Ask a Question Progress Mentor

Unit 2 - Week 1 : Introduction to Combustion

Course outline

How to access the portal?

Week 1 : Introduction to Combustion

- Lecture 1 : Introduction to fundamentals of combustion
- Lecture 2 : Scope and applications of combustion
- Lecture 3 : Scope of combustion(Contd..) and types of fuel and oxidizers
- Lecture 4 : Characterization of liquid and gaseous fuel
- Lecture 5 : Properties of liquid and solid fuels, various modes of combustion
- Quiz : Week 1: Assessment 1
- Week 1: Assessment 1 Solutions
- Week 1 Feedback

Week 2 : Thermodynamics of combustion

Week 3 : Thermochemistry

Week 1: Assessment 1

The due date for submitting this assignment has passed. **Due on 2018-02-21, 23:59 IST.**

Submitted assignment

1) Which type of fuel can be used to determine the calorific value using Junker's calorie meter? **1 point**

- Solid fuels
- Liquid fuels
- Gaseous fuels
- Pulverised coal

No, the answer is incorrect.

Score: 0

Accepted Answers:

Gaseous fuels

2) The deficiency of air during combustion process leads to **1 point**

- Incomplete combustion
- More amount of CO formation
- Formation of unburnt fuel
- All of above answers

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of above answers

3) Based on mixing mode of the fuel and oxidizers, flames can be classified into... **1 point**

- Premixed flame
- Diffusion flame
- Turbulent flame
- Both (a) and (b)

No, the answer is incorrect.

Score: 0

Accepted Answers:

Both (a) and (b)

4) The minimum temperature at which liquid fuel produces sufficient vapours to form a flammable mixture with air that continuously establish a flame is called... **1 point**

- Flash point
- Smoke point

Week 4 :
Chemical
Equilibrium and
Kinetics

Week 5 :
Chemical
Kinetics

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

Week 7 :
Transport
Phenomena

Week 8 :
Conservation
Equations

- Fire point
 Pour point

No, the answer is incorrect.

Score: 0

Accepted Answers:

Fire point

5) What is the specific gravity of a substance with mass 8 kg and volume 2 m³, with respect to the reference density 50 kg/m³ **1 point**

- 0.06
 0.07
 0.08
 0.09

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.08

6) Substance with specific gravity (SG) 1 has API (American Petroleum Institute) SG **1 point**

- 141.5
 131.5
 10
 100

No, the answer is incorrect.

Score: 0

Accepted Answers:

10

7) The hottest part in a candle flame is..... **1 point**

- outer most non-luminous part
 luminous middle part
 innermost part
 zone near the wick of the flame

No, the answer is incorrect.

Score: 0

Accepted Answers:

outer most non-luminous part

8) In an experiment, 5 kg of fuel was completely burnt. The heat produced was found to be 150MJ. Calculate the calorific value of the fuel in kJ/kg. **1 point**

- 20000
 30000
 40000
 50000

No, the answer is incorrect.

Score: 0

Accepted Answers:

30000

9) The property of element to be classified as a fuel or oxidizer can be dictated by **1 point**

- Atomic radius
 Metallic character
 Oxidation potential
 Electronegativity

No, the answer is incorrect.

Score: 0

Accepted Answers:

Electronegativity

10) Bomb calorimeter can be used to determine the calorific value of

1 point

- Solid fuels
- Liquid fuels
- Gaseous fuels
- Both (a) and (b)

No, the answer is incorrect.

Score: 0

Accepted Answers:

Both (a) and (b)

11) The heating value of the fuel when the latent heat of formation is not recovered is

1 point

- Higher heating value
- Lower heating value
- Heat of formation
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Lower heating value

12) The lowest temperature required to make the combustion self-sustained is

1 point

- Flash point
- Fire point
- Auto-ignition temperature
- Smoke point

No, the answer is incorrect.

Score: 0

Accepted Answers:

Auto-ignition temperature

13) Calorific value of an ideal fuel is

1 point

- High
- Low
- Moderate
- Zero

No, the answer is incorrect.

Score: 0

Accepted Answers:

High

14) Viscosity of a liquid fuel is very much dependent on

1 point

- Pressure
- Pipe diameter
- Temperature
- Color

No, the answer is incorrect.

Score: 0

Accepted Answers:

Temperature

15) A hydrometer is an instrument that measures

1 point

- Specific gravity
- Humidity
- Heating value
- Calorific value

No, the answer is incorrect.

Score: 0

Accepted Answers:

Specific gravity

16) A hygrometer is an instrument that measures

1 point

- Specific gravity
- Heating value
- Calorific value
- Humidity

No, the answer is incorrect.

Score: 0

Accepted Answers:

Humidity

17) The most powerful oxidizer is

1 point

- Fluorine
- Oxygen
- Hydrogen peroxide
- Liquid oxygen

No, the answer is incorrect.

Score: 0

Accepted Answers:

Fluorine

18) The major constituent of LPG is

1 point

- Propane and butane
- Propane and ethane
- Butane and methane
- Propane and biogas

No, the answer is incorrect.

Score: 0

Accepted Answers:

Propane and butane

19) Major constituent of Natural gas is

1 point

- Methane
- Ethane
- Propane
- Butane

No, the answer is incorrect.

Score: 0

Accepted Answers:

Methane

20) Incomplete combustion of a hydrocarbon fuel can lead to production of

1 point

- CO₂
- CO
- Carbon

None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

CO

21) Calculate adiabatic flame temperature at constant pressure for a combustor working **0 points** with stoichiometric n-butane-air mixture. Assuming complete combustion with no dissociation. Assume the specific heat capacity of the combustion products is constant evaluated at 2000 K. The combustor operates at 1 atm with initial mixture entering at 298K.

Given:

$$h_{f,C_4H_{10}}^0(298K) = -124733 \text{ kJ/kmol}$$

$$h_{f,CO_2}^0(298K) = -393546 \text{ kJ/kmol}$$

$$h_{f,H_2O}^0(298K) = -241845 \text{ kJ/kmol}$$

$$c_{p,H_2O}(2000K) = 51.143 \text{ kJ/kmol} \cdot K$$

$$c_{p,CO_2}(2000K) = 60.433 \text{ kJ/kmol} \cdot K$$

$$c_{p,N_2}(2000K) = 35.988 \text{ kJ/kmol} \cdot K$$

2520

2229

2360

2230

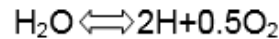
No, the answer is incorrect.

Score: 0

Accepted Answers:

2229

22) A flame exhaust has the composition (by volume) of 14% CO₂, 2% O₂, 12% H₂O, the **0 points** rest is N₂. The flame temperature is 1900K operated at a pressure of 31 atm. Calculate the equilibrium mole fraction of H from the dissociation reaction



Assume that the effect on the mole fractions of the major species negligible.

$$g_{f,H}^0(1900K) = 112859 \text{ kJ/kmol}. g_{f,H_2O}^0(1900K) = -141435 \text{ kJ/kmol}.$$

0.069

0.075

0.047

0.084

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.069

23) Consider the equilibrium reaction $H_2 \rightleftharpoons 2H$ in a reactor vessel. Calculate the **0 points** mole fractions of H₂ and H for T= 2300 K, P =5 atm using following data:

$$g_{f,H}^0(2300K) = 46007 \text{ kJ/kmol} \quad g_{f,H}^0(3000K) = 88664 \text{ kJ/kmol}.$$

0.995,0.005

0.912,0.088

0.934,0.066

0.954,0.046

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.995,0.005

24) Consider the equilibrium reaction $\text{H}_2 \rightleftharpoons 2\text{H}$ in a reactor vessel. Calculate the mole fractions of H_2 and H for $T=2300\text{ K}$, $P=1\text{ atm}$ using following data:

0 points

$$g_{f,H}^0(2300\text{K}) = 46007\text{ kJ/kmol} \quad g_{f,H}^0(3000\text{K}) = 88664\text{ kJ/kmol.}$$

- 0.91,0.09
- 0.71,0.29
- 0.65,0.35
- 0.83,0.17

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

0.91,0.09

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