Assignment 2

Due on 2020-02-12, 23:59 (BST).

1) Mixture A has a scavenging diameter of 1.3 mm, with a density of 3 kg/m³ and flame speed of 90 m/s. Mixture B has a scavenging diameter of 1.5 mm, a density of 2.8 kg/m³, and flame speed of 100 m/s. Which mixture has a flame speed of 40 m/s, a scavenging diameter of 3 mm, a density of 3 kg/m³? What is the maximum char size that would not allow flashback of the flame for mixture B?

   - 1 mm
   - 2 mm
   - 3 mm
   - 4 mm
   Score: 1 point
   Accepted Answers:
   - 1 mm
   - 2 mm

2) Arrange CH3, OH, H2, and CO in the ascending order of ignition energy.

   - CH3, OH, H2, CO
   - OH, CH3, H2, CO
   - H2, CH3, OH, CO
   - CO, H2, CH3, OH
   Score: 1 point
   Accepted Answers:
   - OH, CH3, H2, CO
   - H2, CH3, OH, CO
   - CO, H2, CH3, OH

3) The burning time of a 1-m-thick layer of a fuel of density under certain conditions is 106 s. Under the same conditions, what is the burning time of a 1-m thick layer of coal?

   - No, the answer is incorrect.
   - Yes, the answer is correct.
   Score: 1 point
   Accepted Answers:
   - Yes, the answer is correct.
   - No, the answer is incorrect.

4) Methane-air mixture has a flame speed of 40 m/s. If the unburnt mixture velocity is 20 m/s from a tube, the flame would

   - Remain stationary
   - Move away from the unburnt mixture
   - Move towards the unburnt mixture
   - Can’t be determined
   Score: 1 point
   Accepted Answers:
   - Move towards the unburnt mixture
   - Move away from the unburnt mixture

5) Which of the following are true?

   - Minimum ignition energy is dependent on heat release and heat loss from the flame
   - Ignitability limits are a manifestation of heat loss
   - At the pipe diameter is less than the annular diameter the flame can propagate through it
   - Laminar flame speed is a fundamental property of the fuel-air mixture
   - Select the appropriate statements that are true
   - Flame temperature is always corresponding to equilibrium temperature for non-premixed flames regardless of the effect on the temperature of re-oxidation of products of unburned mixture
   - Laminar flame speed is an empirical relationship between the laminar burning velocity of premixed flames and the temperature of the burned gases
   - No, the answer is incorrect.
   - Yes, the answer is correct.
   Score: 1 point
   Accepted Answers:
   - Yes, the answer is correct.
   - No, the answer is incorrect.

6) A practical flame has a density of 1.3 kg/m³ and flame speed of 6 m/s below the average reaction rate (in mm/s). Given thermal conductivity is 0.03 W/(m·K) and Cp = 1.2 kJ/(kg·K), what is the flame thickness?

   - No, the answer is incorrect.
   - Yes, the answer is correct.
   Score: 1 point
   Accepted Answers:
   - Yes, the answer is correct.
   - No, the answer is incorrect.

7) Calculate the H2O of the dry flue gas having 50% of droplets with diameters between 180 microns, 50% with 150 microns and the rest with 40 micrometre.

   - No, the answer is incorrect.
   - Yes, the answer is correct.
   Score: 1 point
   Accepted Answers:
   - Yes, the answer is correct.
   - No, the answer is incorrect.

8) If a fuel-air mixture has a density of 1.3 kg/m³ and flame speed of 6 m/s below the average reaction rate (in mm/s). Given thermal conductivity is 0.03 W/(m·K) and Cp = 1.2 kJ/(kg·K), what is the flame thickness?

   - 1 point

9) Which of the following are true for a non-premixed flame?

   - The flame is located where fuel and air are at stoichiometric proportion when the reactions can be assumed to be infinite time.
   - The flame separates the fast from the slow oxidizer when the reactions are assumed to be infinitely fast.
   - Chemistry plays an important role in advection and ignition of non-premixed flames.
   - The flame is located where fuel and oxidizer are at stoichiometric proportion when the reactions can be assumed to be infinite time.
   - The flame separates the slow from the fast oxidizer when the reactions are assumed to be infinitely fast.
   - Chemistry plays an important role in advection and ignition of non-premixed flames.
   Score: 1 point
   Accepted Answers:
   - Yes, the answer is correct.
   - No, the answer is incorrect.