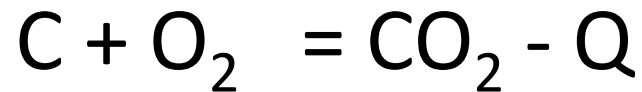


Flame & Combustion

Prabir Basu

What is combustion

Combustion is a exothermic oxidation of a fuel at high temperature.



WHAT IS A FLAME

Flame is a zone of intense chemical reaction with liberation of heat and light

Flame types

Diffusion flame



Premixed flame

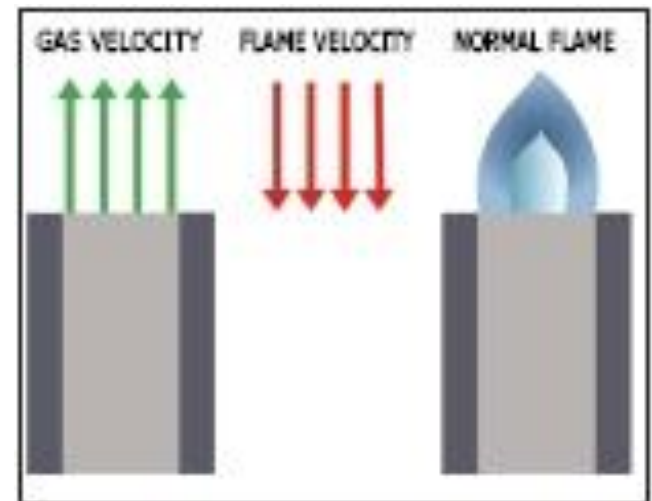


Flame velocity

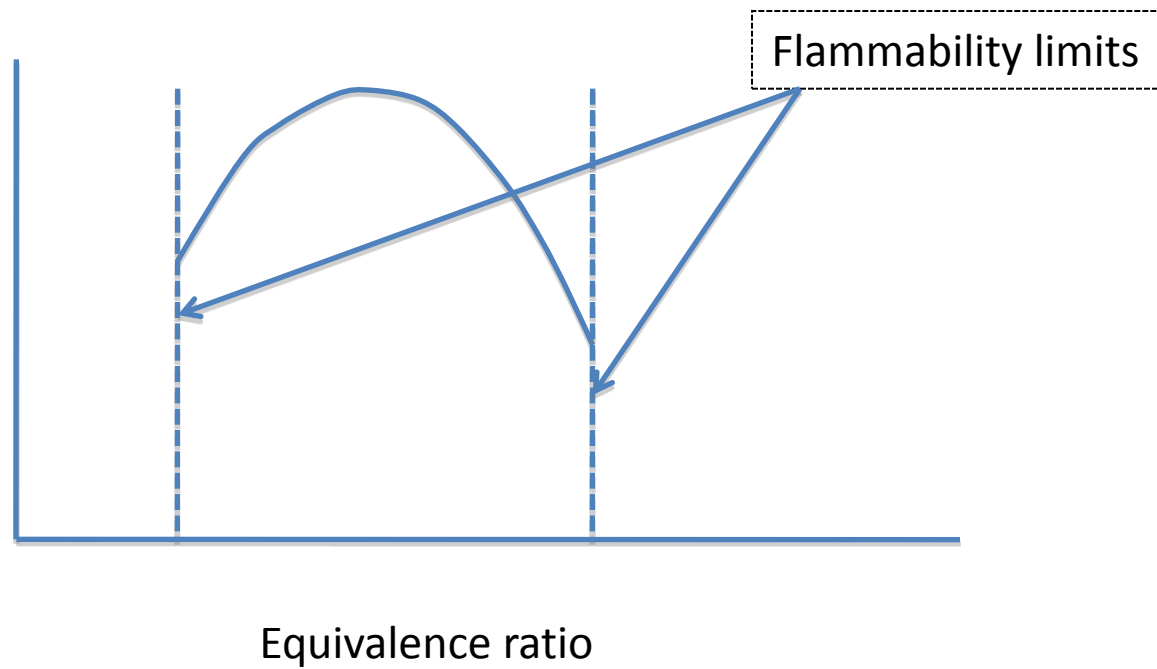
Flame travels at a specific speed against the unburnt mixture. This speed is equal to the local mixture velocity for a stable velocity, and it depends on;

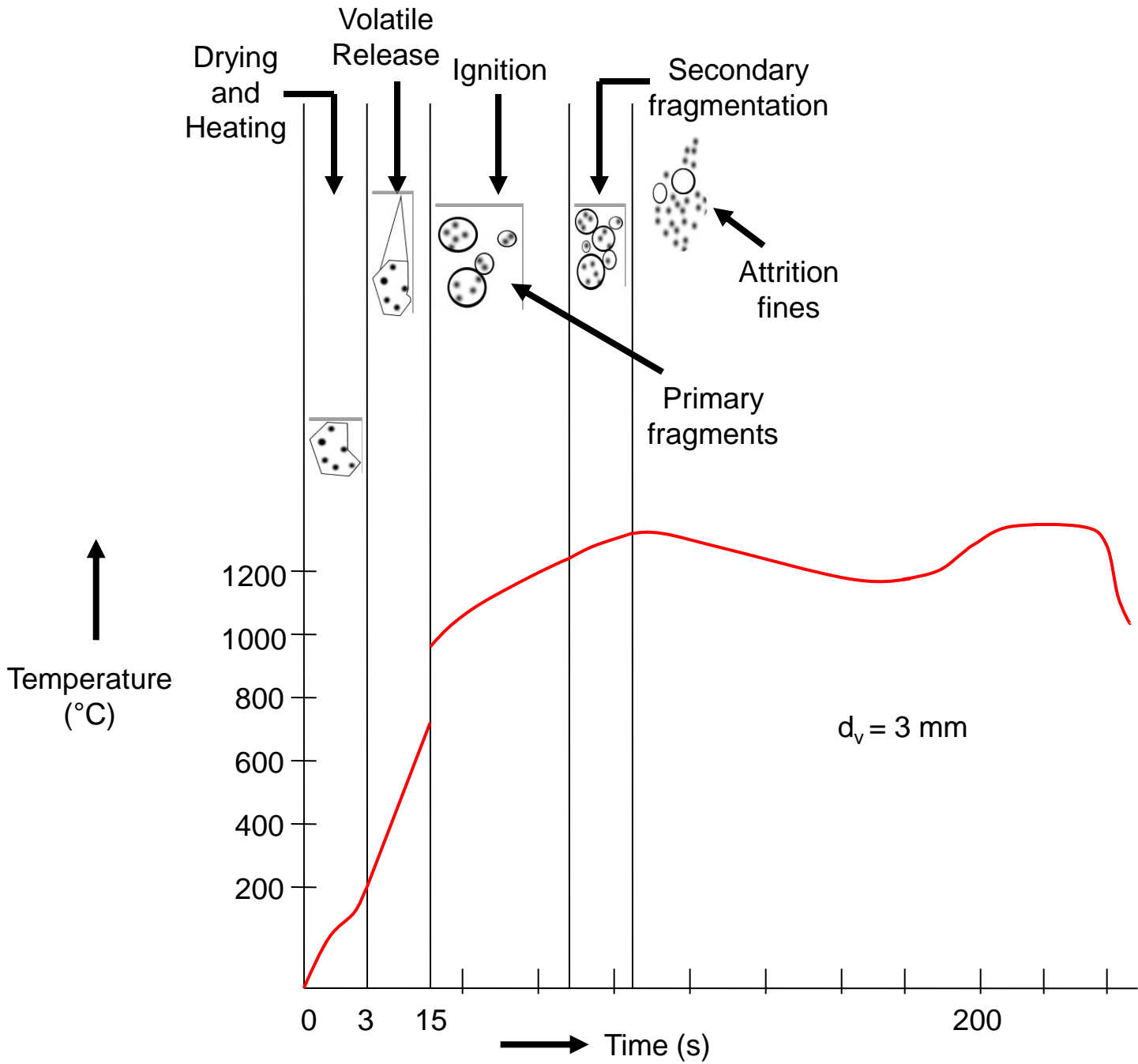
1. Fuel: air mixture ratio (increases and decreases)
2. Preheat temperature of the mixture (increases)
3. Turbulence intensity in the flow field (increases)

This velocity is also called burning velocity. This velocity is equal to the local velocity of the unburnt gas normal to the flame front.



Flame velocity





Drying and Heating

Volatile Release

Ignition

Secondary fragmentation

Attrition fines

Primary fragments

↑
Temperature (°C)

1200

1000

800

600

400

200

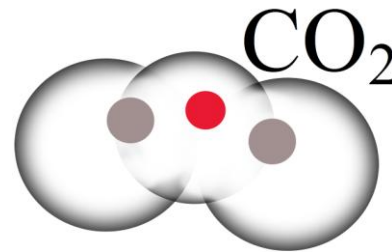
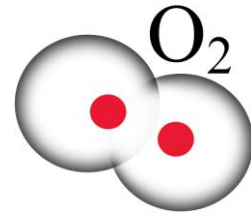
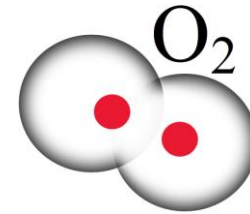
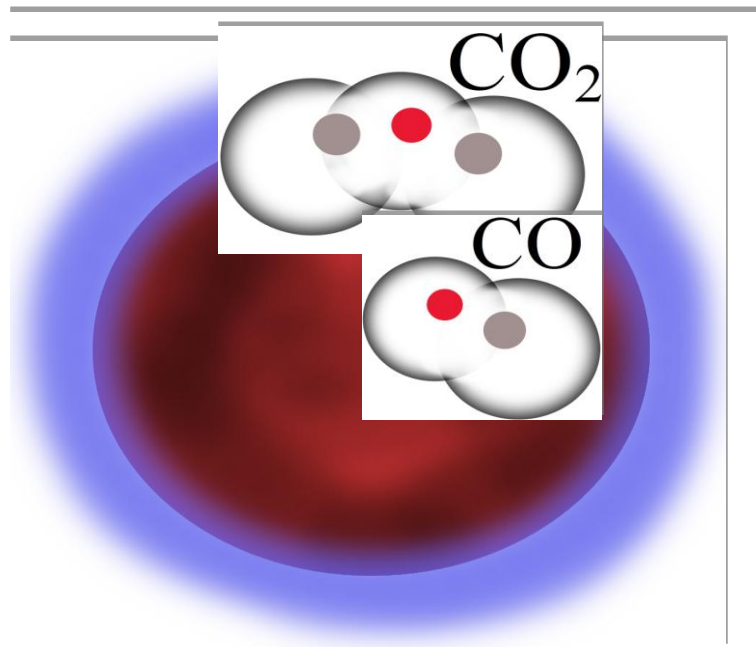
0 3 15 200

→ Time (s)

$d_v = 3 \text{ mm}$

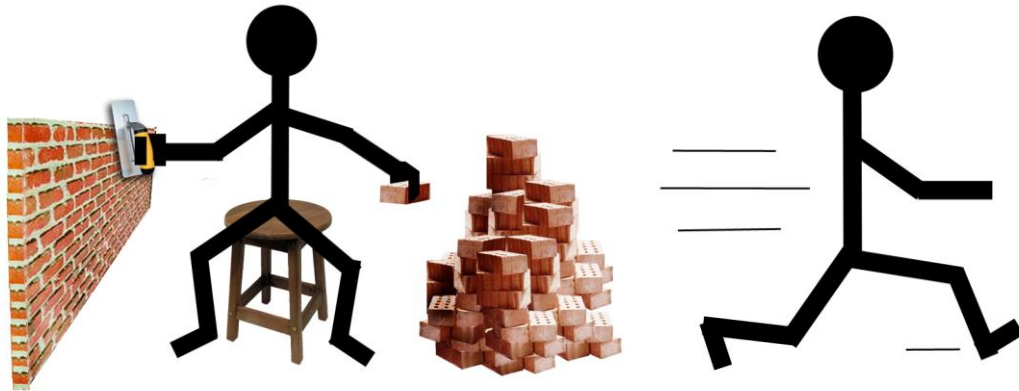


Coal Combustion



Mass Transfer

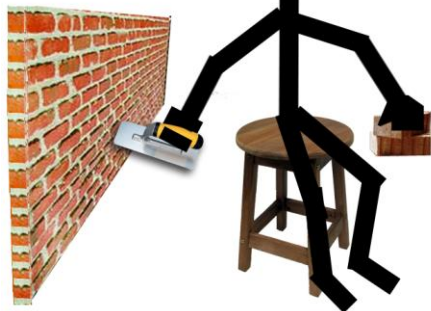
Reaction



Mass Tran



Reaction



Mass Transfer

