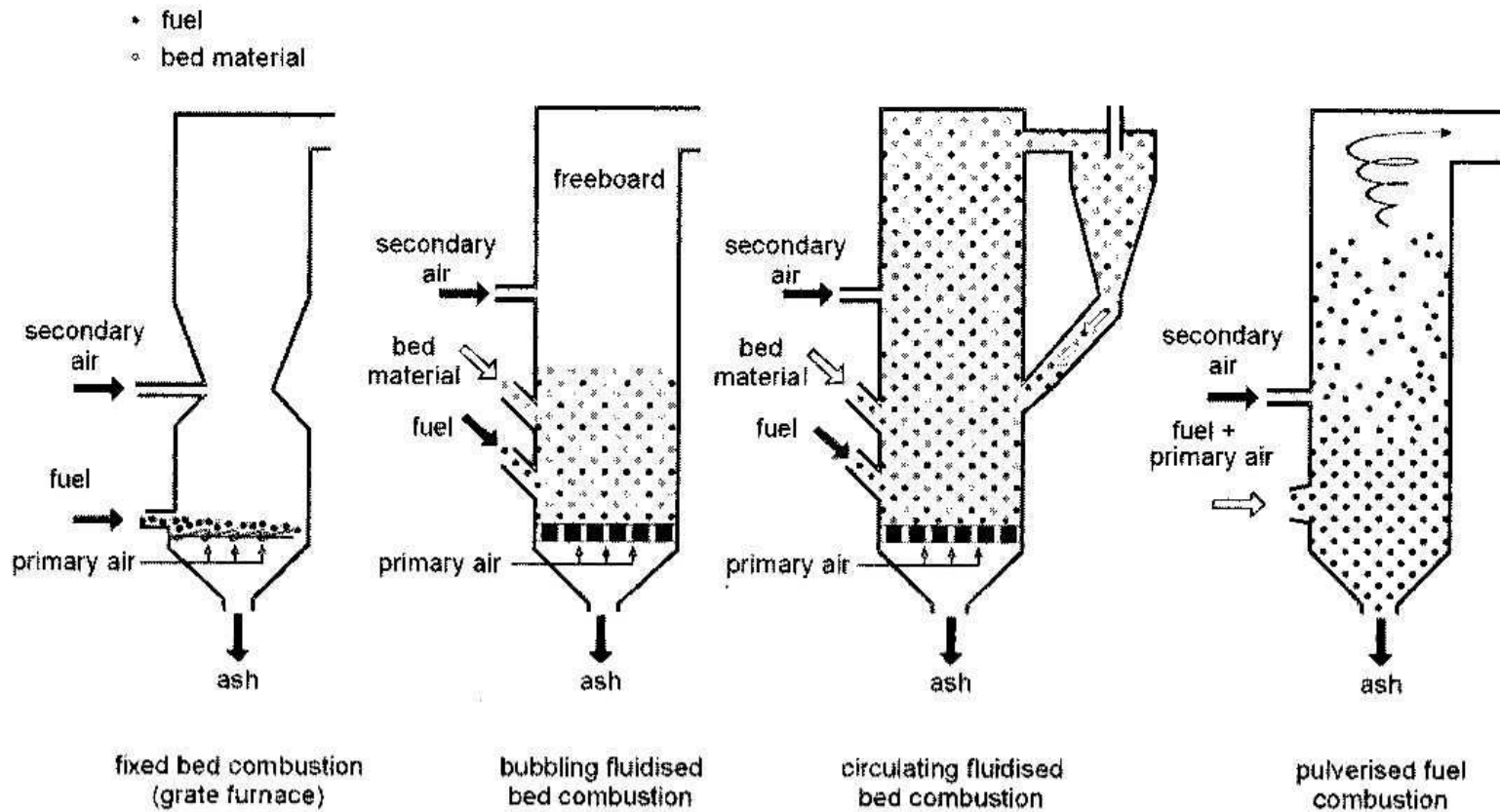
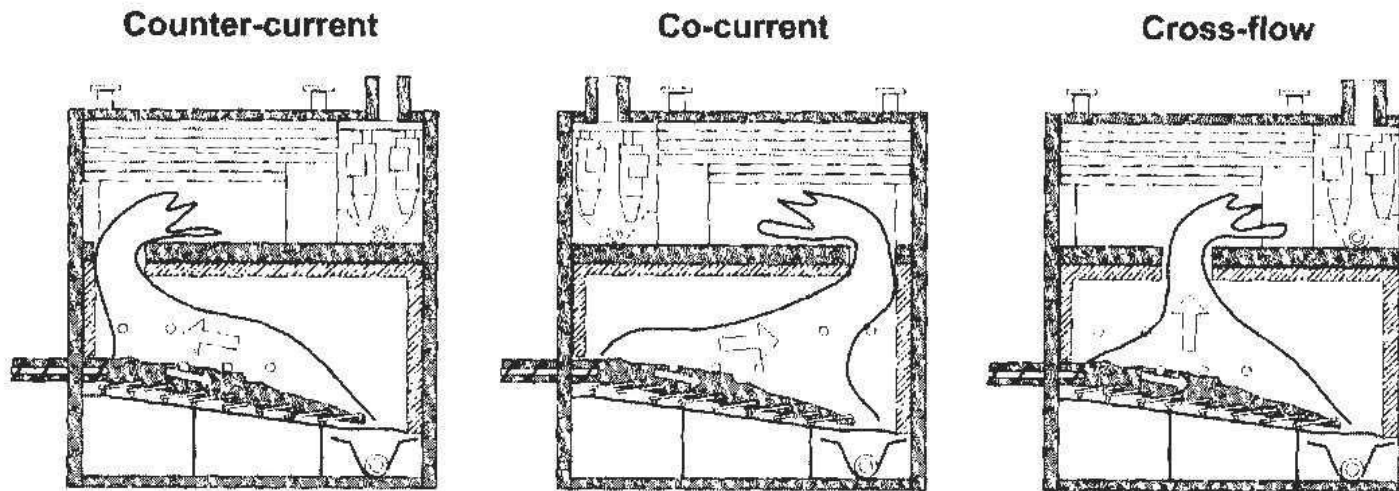
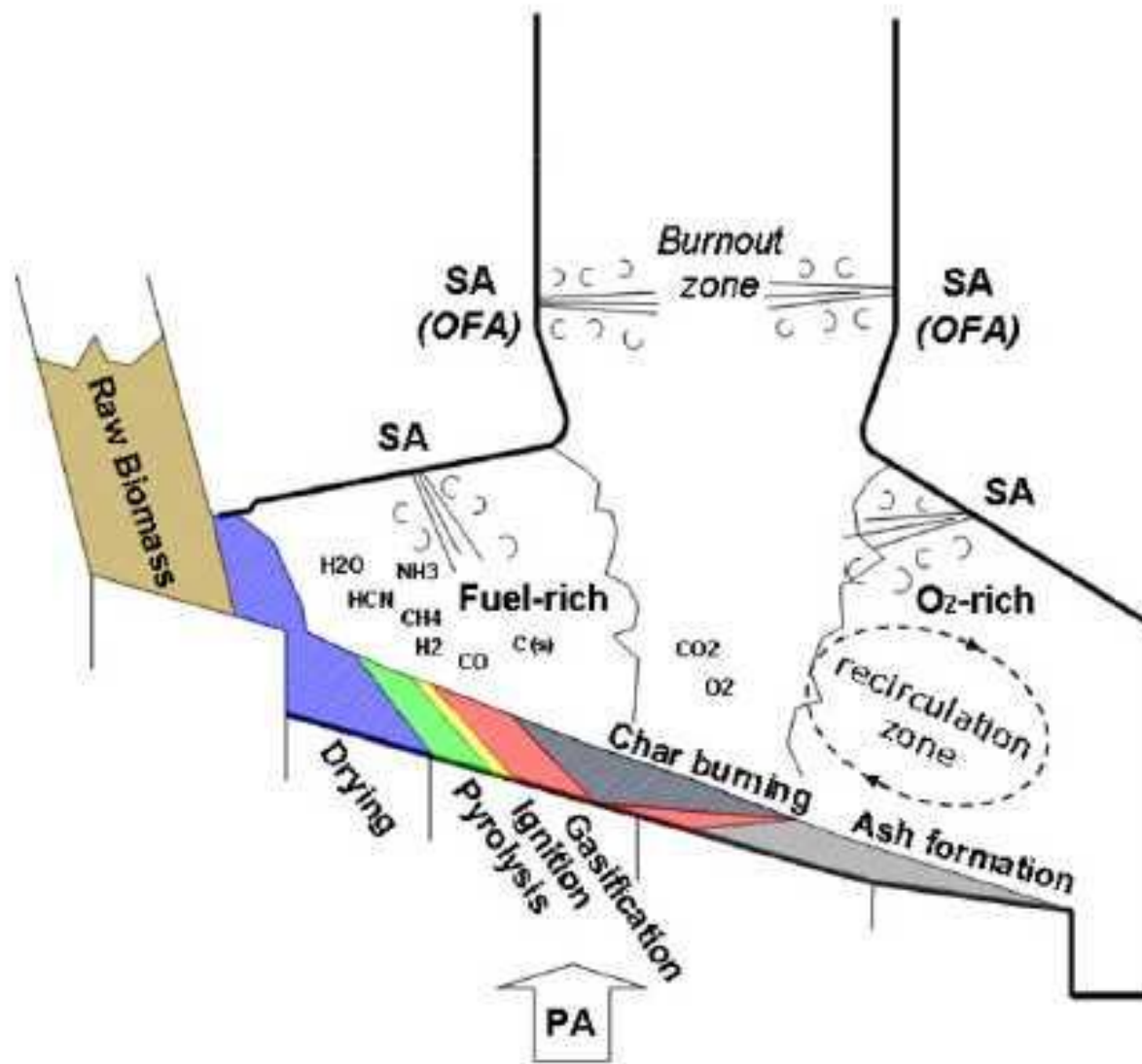


SISTEMAS DE COMBUSTÃO PARA SÓLIDOS



Classificação de sistemas de combustão em leito fixo





Idealização dos fenômenos de combustão em grelha

Dois tipos de grelhas para combustível sólido

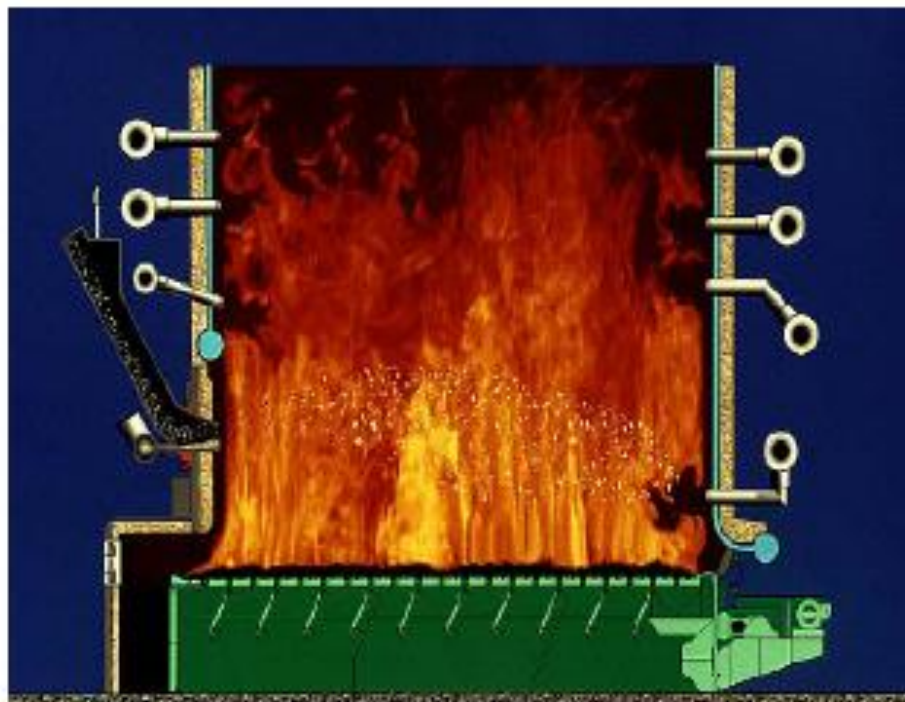
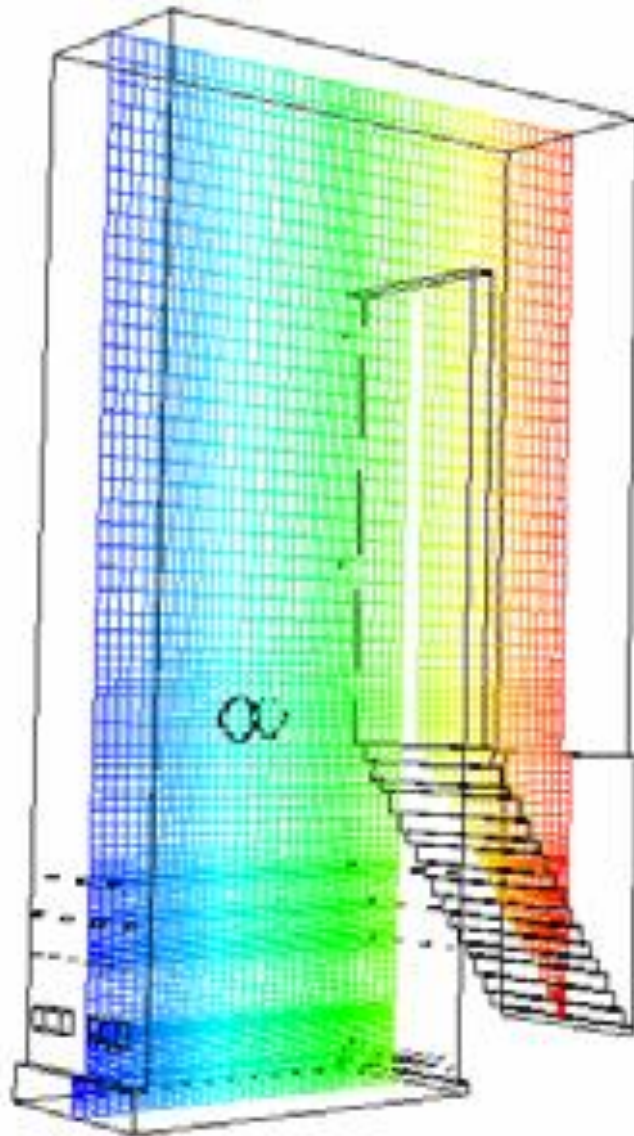


Figure 5 – Air-Cooled Vibrating Grate

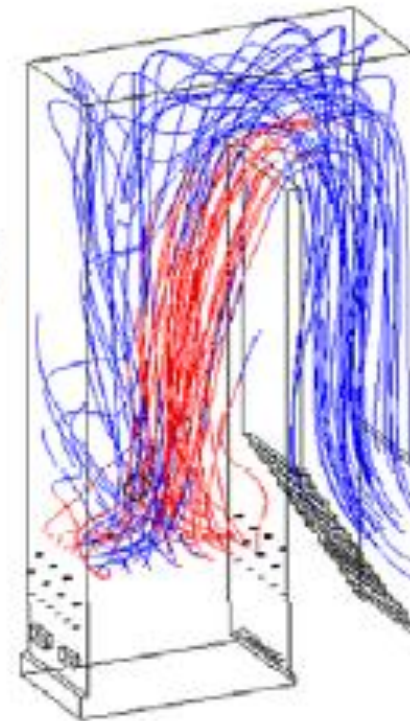


Figure 4 – Air-Cooled Travel Grate



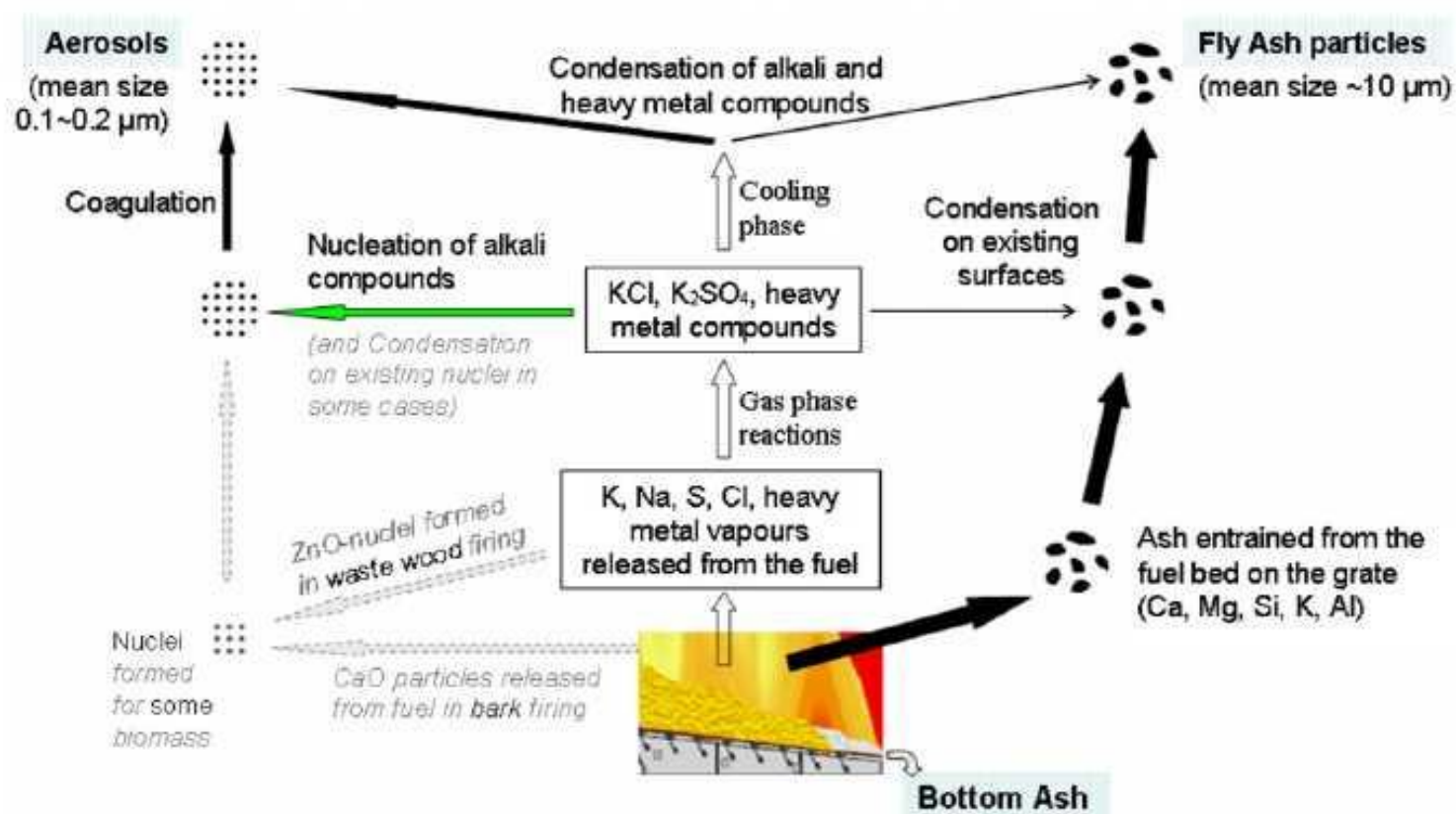
Simulação em CFD – computacional fluid dynamics

Average residence
time ≥ 850 C = 1.69
seconds.



Blue < 850 C

Red > 850 C



Formação de cinzas volantes e aerossóis na combustão em grelha

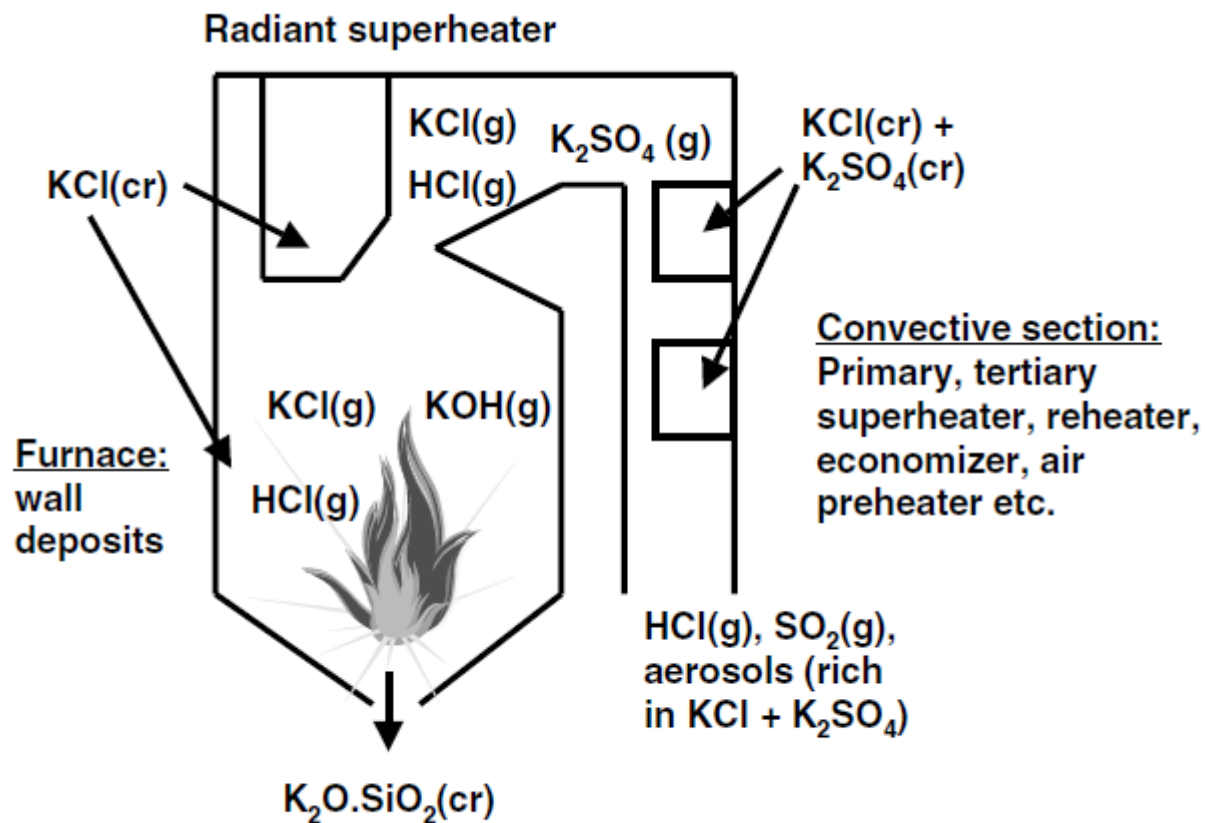


Fig. 1. Principal pathways of potassium, sulfur and chlorine in a biomass-fired boiler.

Depósitos de cinzas devido à potássio, sódio e enxôfre

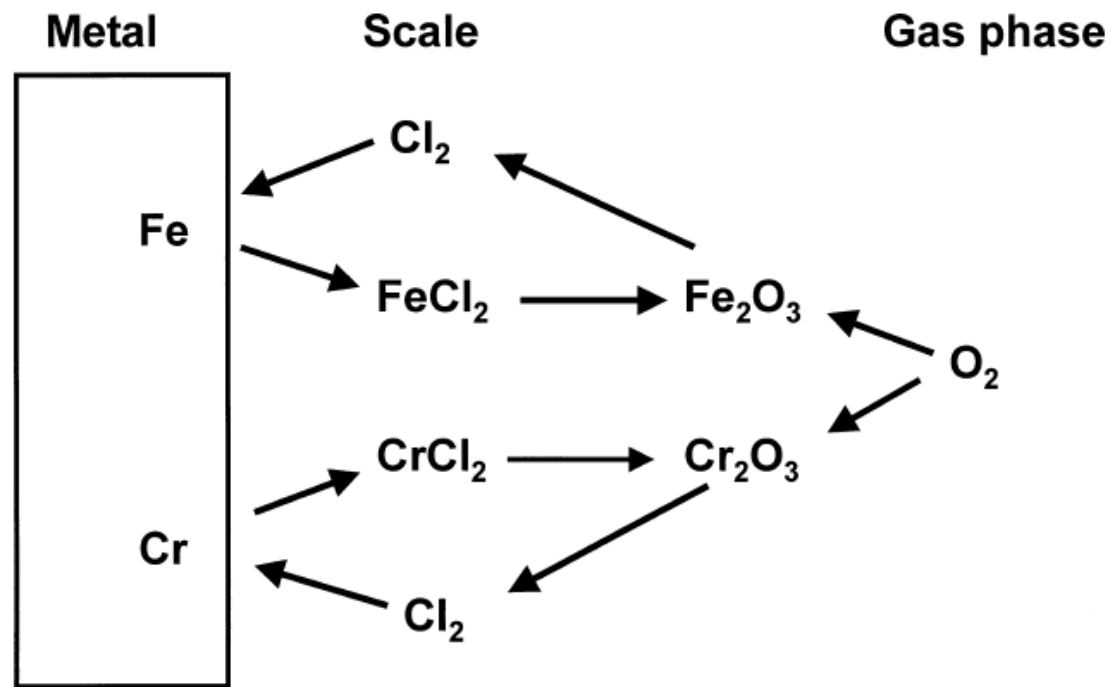
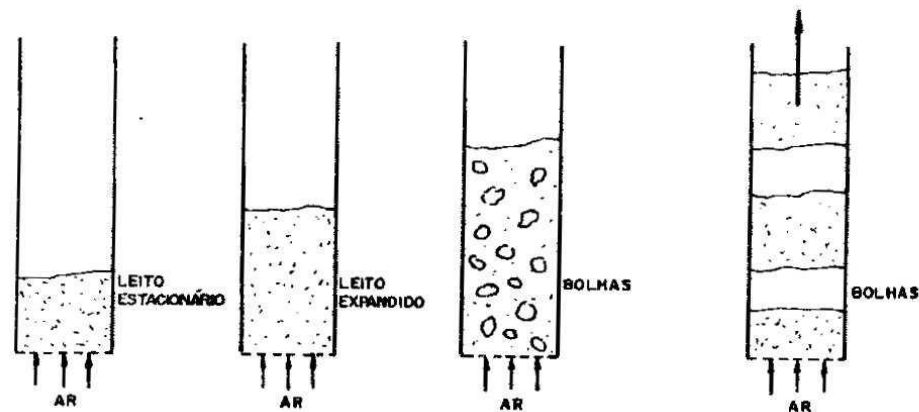
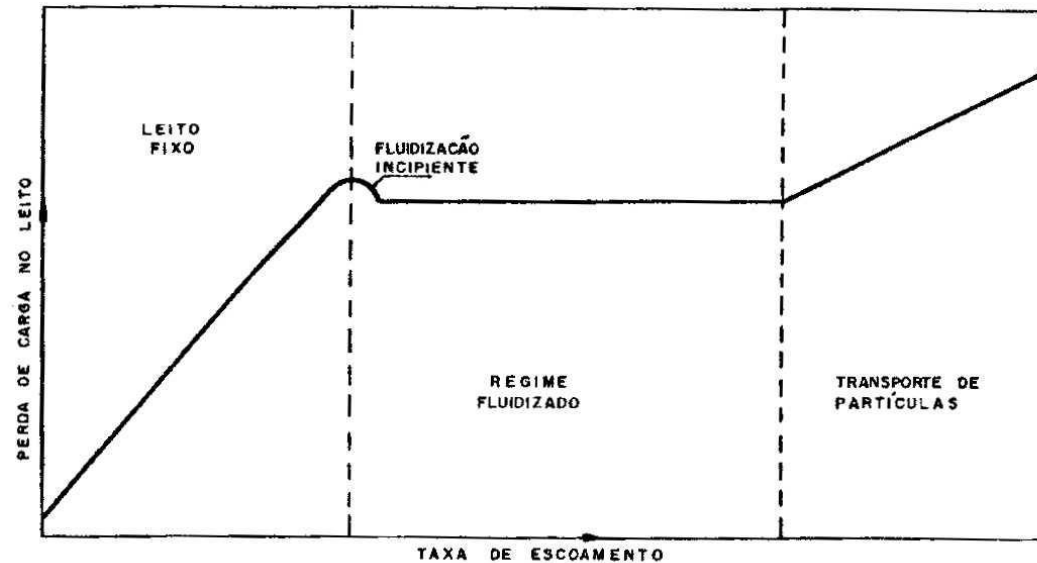
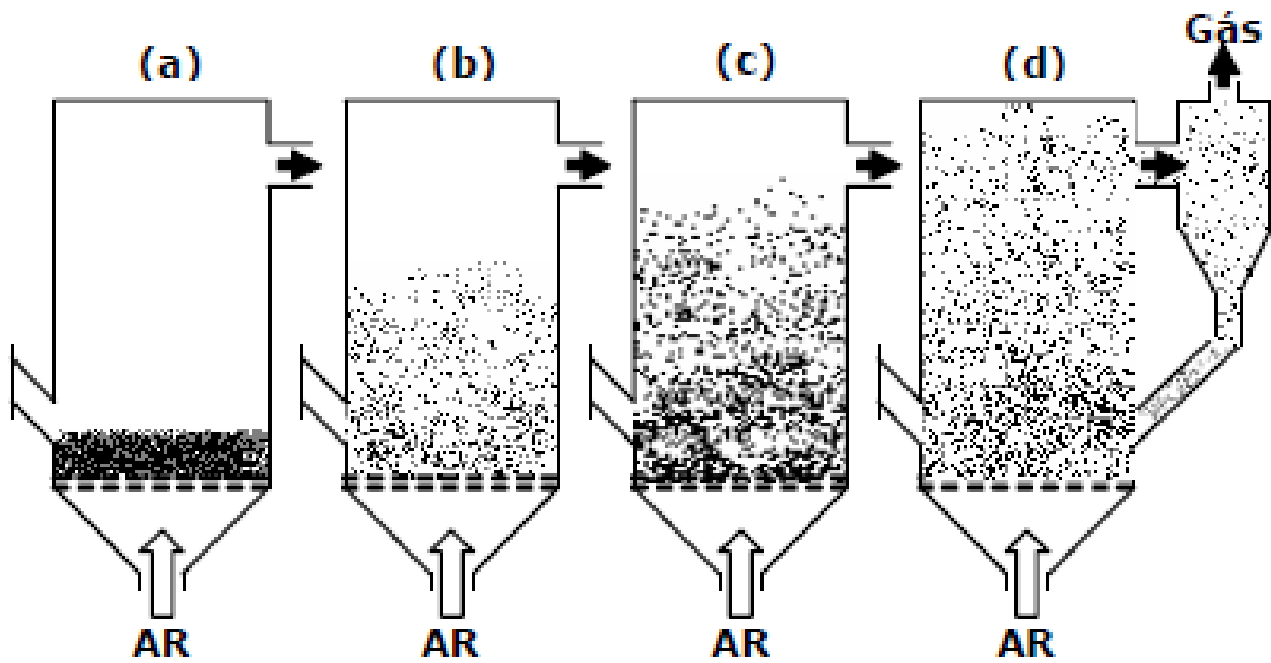


Fig. 4. Schematic drawing of corrosion caused by $\text{Cl}_2(\text{g})$.

Possível mecanismo de corrosão devido ao cloro

Combustão em leito fluidizado





Regimes de fluidização

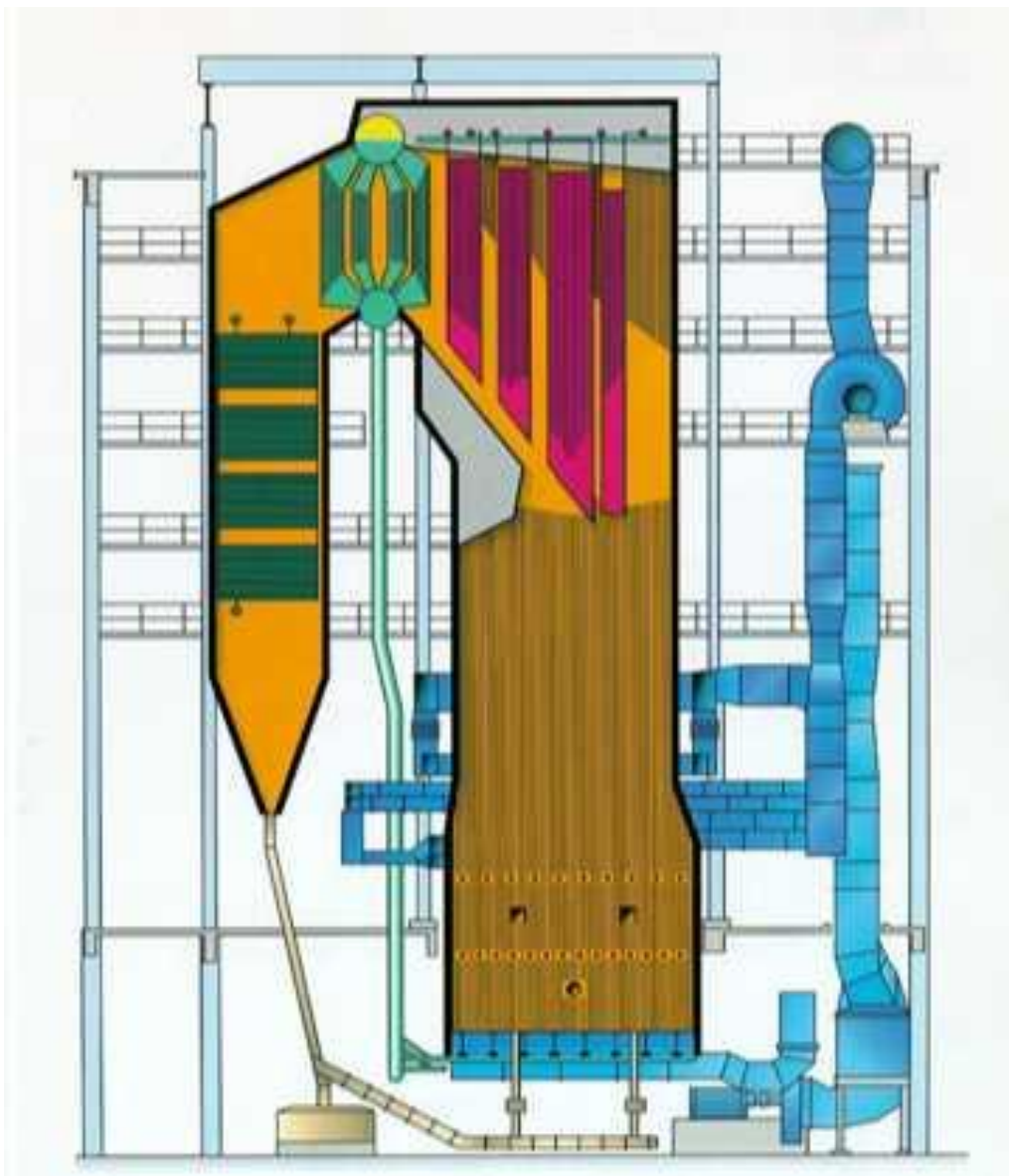
Design parameter	BFB	CFB
Combustion temperature (°C)	760–870	800–900
Fuel particle size (mm)	0–50	0–25
Fluidization velocities (m/s)	1–3	3–10
Solids circulation	No ^a	Yes
Particle concentration	High in bottom, low in freeboard	Gradually decreasing along furnace height
Limestone ^b particle size (mm)	0.3–0.5	0.1–0.2
Average steam parameters ^c		
Steam flow (kg/s) (range)	36 (13–139)	60 (12–360)
Steam temperature (°C) (range)	466 (150–543)	506 (180–580)
Steam pressure (bar) (range)	72 (10–160)	103 (10–275)

^aCirculation of (large) unburned particles is possible in the case of bad burnout. However, solid circulation in BFB is compared to CFB a less integrated part of the combustion process.

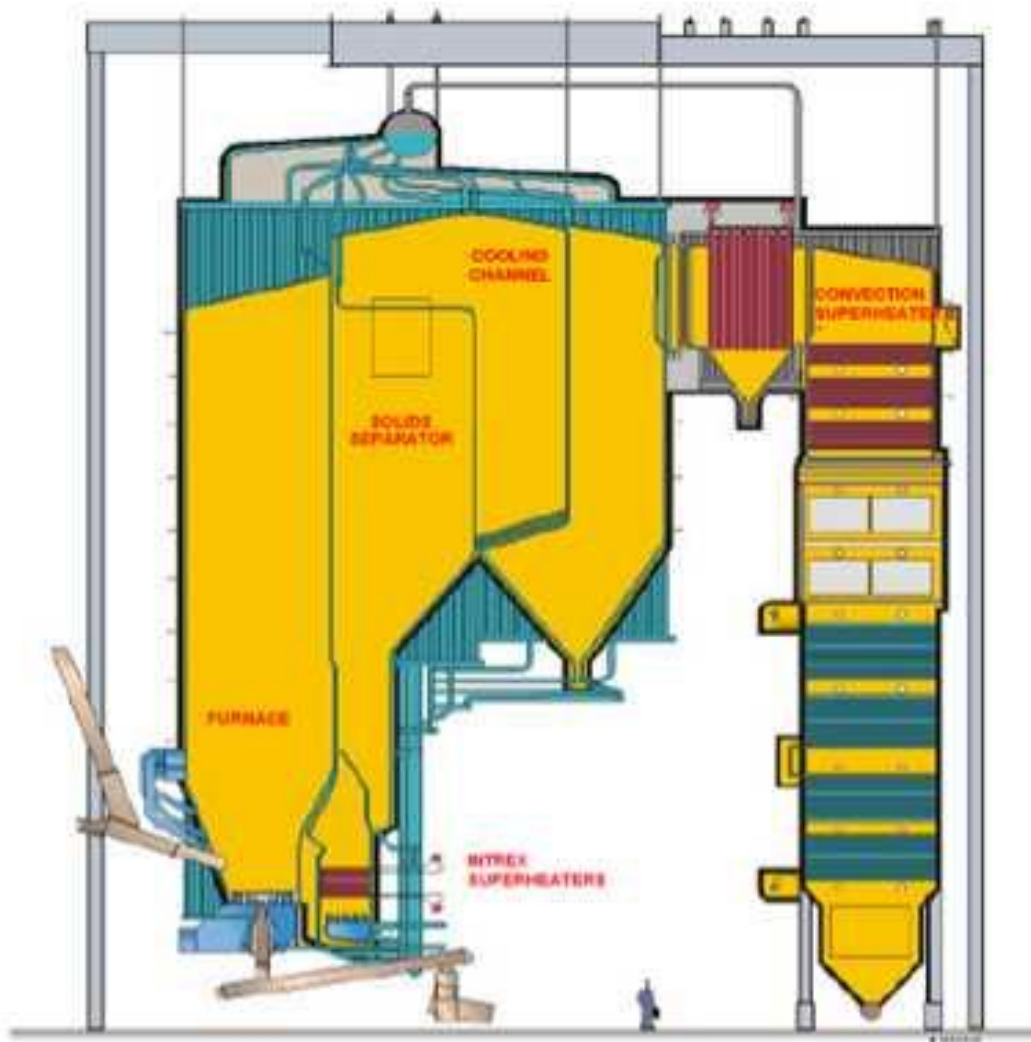
^bApplicable in the case when limestone is used for in bed sulphur removal.

^cData on steam parameters is collected for ca. 400 FBC installations. The data is as mentioned in Section 4 derived from [3,12–14].

Principais parâmetros para caldeiras de leito fluidizado borbulhante (BFB) e de leito fluidizado circulante (CFB)



Caldeira de leito
fluidizado
borbulhante



Caldeira de leito
fluidizado circulante