CLC一維非均相模式

(1)

固體顆粒內氣體質量平衡修改

(1)

固體顆粒與內部氣體能量平衡

(2)

流體各成分i質量平衡

(3)

流體能量平衡

(4)

動量平衡

(5)

initial condition(forward flow pass at t = 0)



boundary condition (forward flow pass at z = 0)

(6)

(7)

boundary condition (backward flow pass at z = L)

(8)

(9)

固體質量平衡

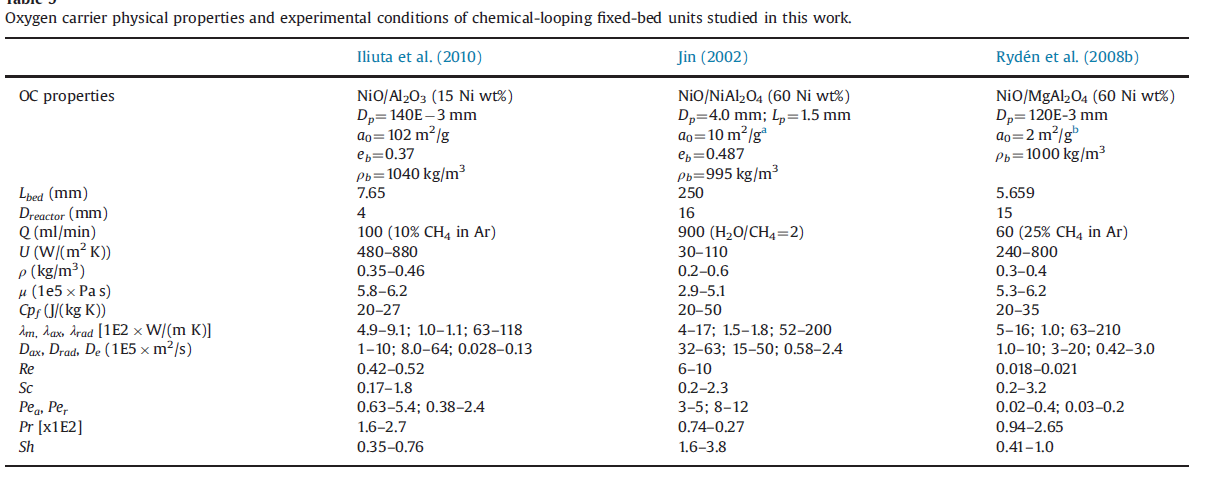
(10)

(11)

(12)



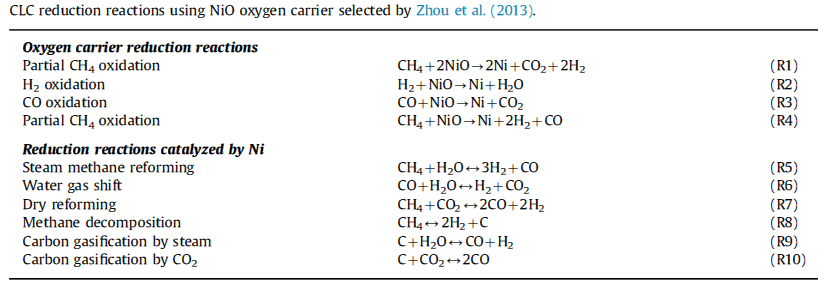
氧載體初始濃度也是以Heterogeneous modeling of chemical-looping combustion. Part 1: Reactor model 所提供資訊



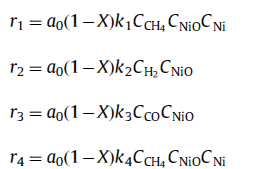
以重量百分濃度做為依據

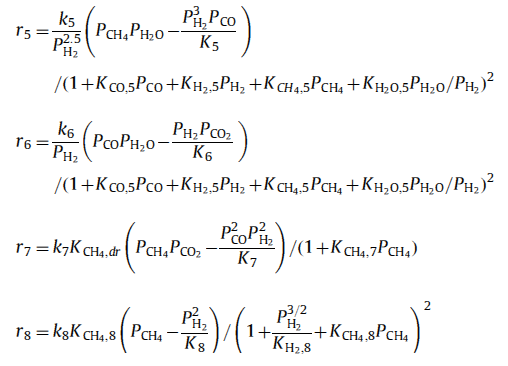
攜氧載體的物體性質: Heterogeneous modeling of chemical-looping combustion. Part 1- reactor model-2013

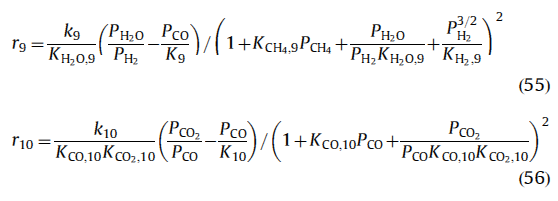
還原反應式



反應動力學







氣體與固體總質量平衡

(13)

(14)

(15)

(15-1)

(15-1)

(15-1)

(15-2)

(15-2)

(15-3)

*、與分別為氣體質量流率、氣體混合物之分子量與氣體混合物之總濃度。*

單位

u\_s(i) = (((1-porosity\_bed)\*ro\_solid\*CM\_NiO\_in\*X\*0.5\*Mw\_O2/Mw\_Ni)\*dz+(Mw\_t(1)\*u\_s(1)\*CM\_t(1)))/Mw\_t(i)/CM\_t(i); %Gas superficial velocity (m/s)

模式假設

1. 體積恆定的球形氧載體
2. 忽略流動方向擴散效應
3. 忽略觸媒內部效應只考慮觸媒表面

4. 假設絕熱反應器

5. 假設徑向之濃度與溫度為均一分佈

**Concentrations:**

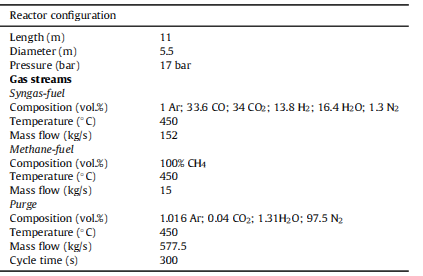
基本關係：

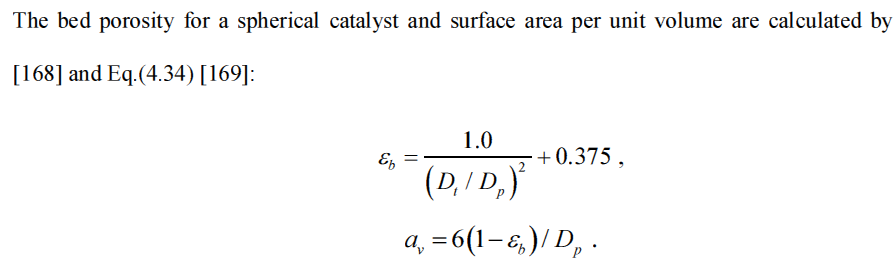
[=] mol/m3 )

初始氧載體濃度:

**Flow rates:**

進料條件:





**Porosity of fixed bed :**

(16)

Diameter of tube (m)

Diameter of particle (m)

Particle surface area:

[=] 1/m (17)

Partical Reynold number：

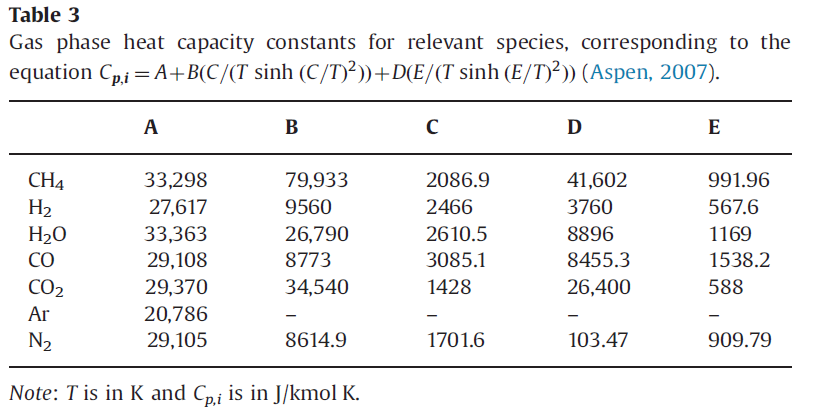
(18)

Schmidt number:

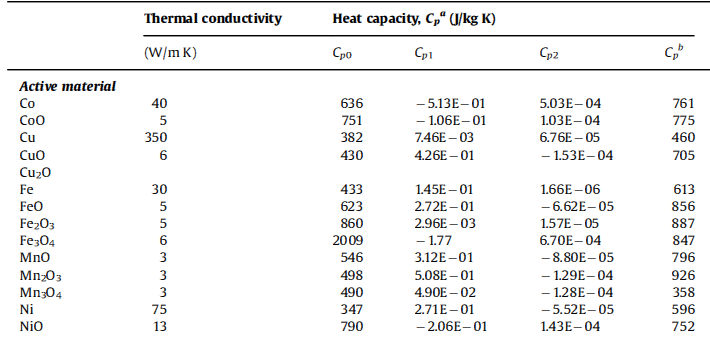
(19)

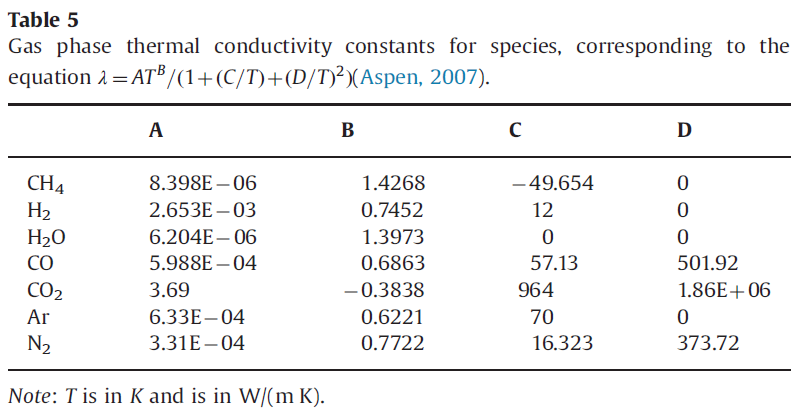
Heat capacity of fluid

[=] J/(mol\*K) (20)



流體莫耳熱容量: Heterogeneous modeling of chemical-looping combustion. Part 1- reactor model-2013

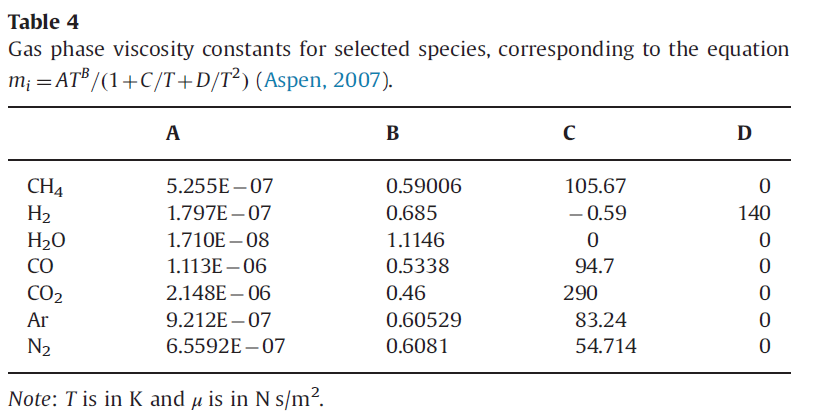




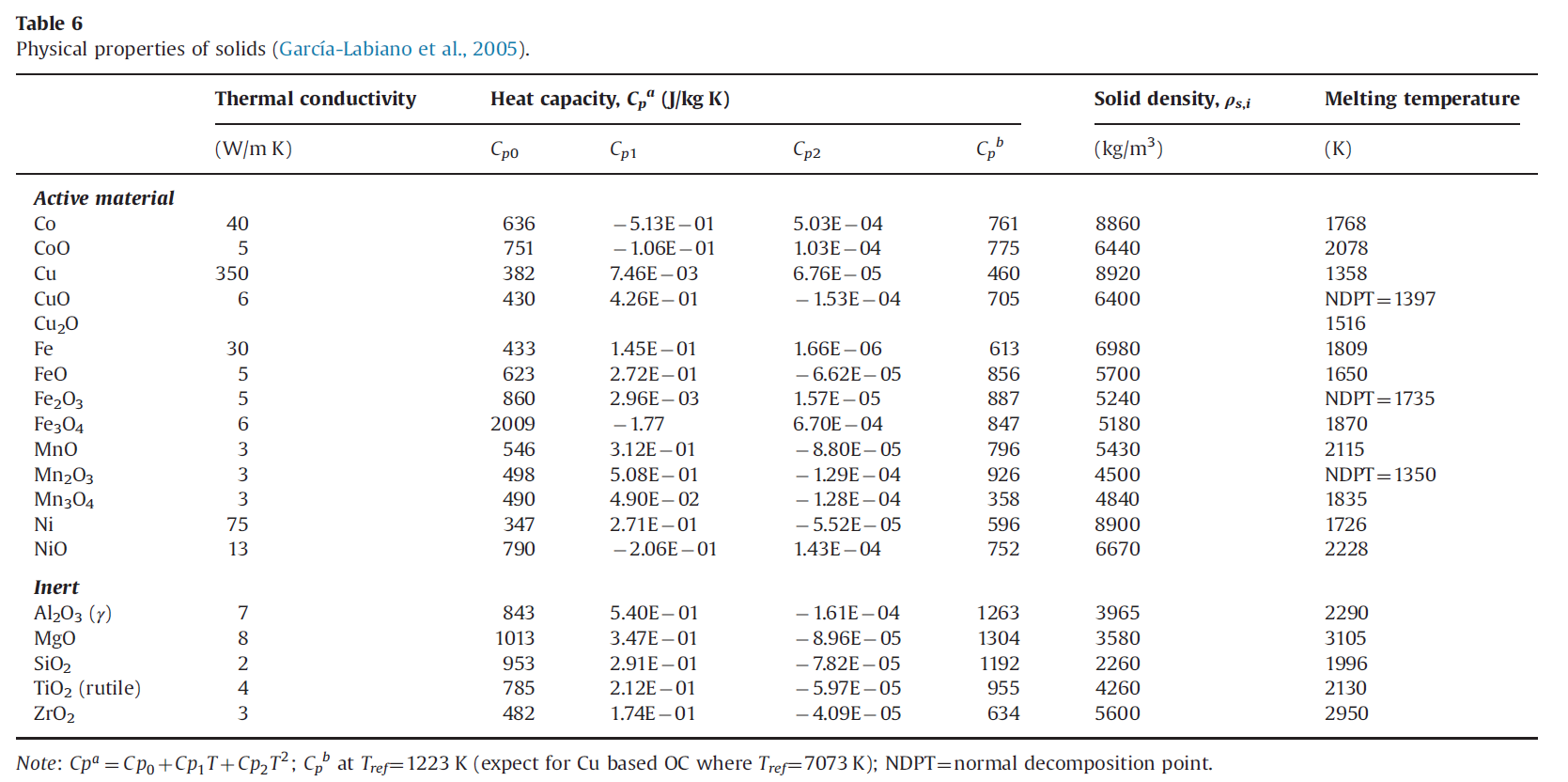
氣相的熱傳導: Heterogeneous modeling of chemical-looping combustion. Part 1- reactor model-2013

Gas phase viscosity constant

[=] N\*s/ m2 (23)



氣體黏度: Heterogeneous modeling of chemical-looping combustion. Part 1- reactor model-2013



**Heat capacity of solid phase**

[=] J/Kg\*K (21)

固體的物理性質: Heterogeneous modeling of chemical-looping combustion. Part 1- reactor model-2013

Boundary conditions:

質傳與熱傳系數

(24)

(25)

因次分析

熱傳系數的部分需再多除以總分子量才符合單位