化工原理习题答案（上册）

第一章　流体流动

1　P_A（绝）= 1.28×10^5 N/m^2

　P_A（表）= $2.66\times10^4 N/m^2$

2　W = 6.15 吨

3　F = 1.42×10^4N

　P = 7.77×10^4Pa

4　H = 0.39m

5　△P = $2041\times10^5 N/m^2$

6　P = 1.028×10^5Pa　　△h = 0.157m

7　P（绝）= 18kPa　　H = 8.36m

8　H = R　　$P_A > P_B$

9　略

10　$P = P_a \exp[-Mgh/RT]$

11　u = 11.0m/s ;　G = 266.7kg/m^2s

　q_m = 2.28kg/s

12　R = 340mm

13　q_v = 2284m^3/h

14　τ = 1463s

15　H_f = 0.26J/N

16　会汽化

17　$$u_1 = A_2\sqrt{\frac{2(P_1-P_2)}{\rho(A_1^2-A_2^2)}}$$

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18　F = 4.02×10^3N

19　略

20　u_2 = 3.62m/s ; R = 0.41m

21　F = 151N

22　v = $5.5\times10^{-6}$$m^2$/s

23　$\frac{\bar{u}}{u_{max}}$ =0.817　　a = 1.06

24　略

25　P（真）= 95kPa ; P（真）变大

26　Z = 12.4m

27　P（表）= $3.00\times10^5 N/m^2$

28　q_v = 3.39m^3/h　　P_1 变小，P_2 变大

29　q_v = 1.81m^3/h

30　H = 43.8m

31　τ = 2104s

32　H_e = 38.1J/N

33 q_v =0.052m^3/s=186m^3/h

34 q_{v1} = 9.7m^3/h ; q_{v2} = 4.31m^3/h

q_{v3} = 5.39m^3/h ; q'_{v3} = 5.39m^3/h

35 q_{vB}/q_{vC} = 1.31 ; q_{vB}/q_{vC} =1.05 ;能量损失

36 P_1（绝）=5.35×10^5Pa

37 $\bar{u}$ = 13.0m/s

38 q_v = 7.9m3/h

39 q_{VCO2}（上限）=3248l/h

40 $\frac{du}{dy}$ = 500 l/s ； τ=3×10^4Pa

F = 3×10^2N　P = 150w

41 h_e = 60.3J/kg

42 τ_y = 18.84Pa　μ_∞ = 4.55Pa·s

43 τ_y = 39.7Pa

44 略

第二章　流体输送机械

1 H_e = 15+4.5×$10^5 q_V^2$

H_e = 45.6J/N　P_e = 4.5KW

2 P = ρω$^2r^2$/2 ；　Φ/ρg = u^2/2g = 22.4J/N

3 H_e = 34.6J/N ； η = 64%

4 略

5 q_V = 0.035m^3/s ; P_e = 11.5KW

6 串联

7 q_V = 0.178m^3/min ; $q_{V'}$ = 0.222m^3/min

8 会汽蚀

9 安装不适宜，泵下移或设备上移

10 IS80-65-160 或 IS100-65-315

11 η_v = 96.6%

12 不适用

13 P = 33.6KW ; T_2 = 101.0℃

14 q_v = 87.5m^3/h ; 选 W_2

第三章　流体的搅拌

1 略

2 P = 38.7w ; P’ = 36.8w

3 d/d_1 = 4.64 ; n/n_1 = 0.359 ; N/N_1 = 100

第四章　流体通过颗粒层的流动

1 △φ = 222.7N/m^2

2 △φ/L = 1084Pa/m

3 V = 2.42m^3

4 $K = 5.26\times10^{-4}m^2/s$; $q_e = 0.05m^3/m^2$

5 A = 15.3m2 ; n = 2 台

6 略

7 $\triangle V_0 = 1.5L$

8 $\triangle V = 13L$

9 $q = 58.4l/m^2$; $\tau_w = 6.4min$

10 $\tau = 166s$; $\tau_w = 124s$

11 $K = 3.05\times10^{-5}m^2/s$

$V_e = 5.06\times10^{-2}m^3$; $V = 0.25m^3$

12 n' = 4.5rpm ; L'/L = 2/3

第五章 颗粒的沉降和流态化

1 $u_t = 7.86\times10^{-4}m/s$; $u_t' = 0.07m/s$

2 $d_P = 88.8\mu m$

3 $\tau = 8.43\times10^{-3}s$; $s = 6.75\times10^{-5}m$

4 $d_{pmax} = 3.6\mu m$

5 $d_{pmin} = 64.7\mu m$; $\eta_P = 60\%$

6 可完全分开

7 $\zeta Re^2<48$

8 $\eta_0 = 0.925$; $x_{出1} = 0.53$

$x_{出2} = 0.27$; $x_{出3} = 0.20$

$x_{出4} = 0$; $W_{出} = 59.9kg/day$

9 $\varepsilon_{固} = 0.42$; $\varepsilon_{流} = 0.71$; $\Delta\Phi = 3.14\times10^4N/m^2$

10 略

11 $D_{扩} = 2.77m$

12 略

第六章 传热

1 $\delta_1 = 0.22m$; $\delta_2 = 0.1m$

2 $t_1 = 800℃$

3 $t_1 = 405℃$

4 $\delta = 50mm$

5 $(\lambda' - \lambda)/\lambda = -19.7\%$

6 略

7 $Q'/Q = 1.64$ λ小的放内层

8 $a = 330W/m^2*℃$

9 $a = 252.5W/m^2*℃$

10 $q = 3.69kw/m^2$

11 $q_1/q_2 = 1$

12 $w = 3.72\times10^{-3}kg/s$; $w' = 7.51\times10^{-3}kg/s$

13 $T_g = 312℃$

14 $T_w = 746K$

15 $\tau = 3.3hr$

16 $\varepsilon_A = 0.48$; $\varepsilon_B = 0.40$

17 略

18 热阻分率 0.3% $K' = 49.0 W/m^2 \cdot ℃$; $K'' = 82.1 W/m^2 \cdot ℃$

19 $w = 3.47 \times 10^{-5} kg/m \cdot s$; $t_w = 38.7℃$

20 $\delta = 82mm$

21 $a_1 = 1.29 \times 10^4 W/m^2 \cdot ℃$; $a'_2 = 3.05 \times 10^3 W/m^2 \cdot ℃$; R = 7.58*10-5$m^2 \cdot ℃/W$

22 $\delta = 10mm$; $Q_{max} = 11.3KW$

23 $R = 6.3 \times 10^{-3} m^2 \cdot ℃/W$

24 n = 31 ; L = 1.65m

25 L = 9.53m

26 $q_m = 4.0kg/s$; $A = 7.14m^2$

27 $q_{m2} = 10.9kg/s$; n = 36 ; L = 2.06m ; $q'_{m1} = 2.24kg/s$

28 $q_m = 0.048kg/s$

29 $t_2 = 76.5℃$; $t_2 = 17.9℃$

30 $t'_2 = 98.2℃$; 提高水蒸气压强 T ' = 112.1℃

31 $q_{m1} = 1.24kg/s$

32 $T'_2 = 78.7℃$; $t'_2 = 61.3℃$

33 $T = 64.6℃$; $t_{2a} = 123.1℃$; $t_{2b} = 56.9℃$

34 $t_2 = 119℃$

35 $\tau = 5.58hr$

36 单壳层 $\Delta t_m = 40.3℃$; 双壳层 $\Delta t_m' = 43.9℃$

37 $a = 781 W/m^2 \cdot ℃$

38 L = 1.08m ; $t_2' = 73.2℃$

39 $N_P = 2$; $N_T = 114$; $L_{实} = 1.2 L_{计} = 3.0m$; D = 460mm

第七章 蒸发

1 W = 1500kg/h ; $w_1 = 12.8\%$; $w_2 = 18.8\%$

2 $\Delta t = 12.0℃$

3 $A = 64.7m^2$; W/D = 0.839

4 W = 0.417kg/s ; $K = 1.88 \times 10^3 W/m^2 \cdot ℃$; w ' = 2.4%

5 $t_1 = 108.6℃$; $t_2 = 90.9℃$; $t_3 = 66℃$

6 $A_1 = A_2 = 9.55m^2$