University of Melbourne

Department of Chemical Engineering

CHEN20010 MATERIAL AND ENERGY BALANCES

NUMERICAL ANSWERS TO EXERCISE SHEET B

Note the number of significant figures to which each answer is given. Giving an answer to too many figures suggests an accuracy that is not usually warranted. Also note that the units of the answer should be specified.

1. 26.2 ft

2. 1.62 × 103 kg

3. 796.3 psi

4. 93.9 ft/s

5. 5.2 × 106 m3

6. 0.00209 Pa

7. -108 × 103 Btu/lb-mol

8. 2253 kPa

9. a) 5.87 psi

b) 141 kPa

10. 63.43 lb

11. 3.70 L/kg

12. a) 0.055 63 kcal/g

b) 100.1 Btu/lb

c) 2.243 therm/ton

13. 219.98 psi

14. 108.5 N

15. 8.95 × 103 kg/m^3

16. 3.37 hr

17. 22 min

18. 0.7302 atm ft^3/lb-mol °R

19. a) 0.3850 Btu/lb °F

b) 0.3850 cal/ g °C

20. 2.0 × 102 m^3

21. $\rho = 0.06285 + 2.538 \times 10^{-6} T - 7.078 \times 10^{-8} T^2$

22. 0.1383 N

23. $[\hat{V}] = \frac{L^3}{N}$ and $[a] = \frac{M L^5}{N^2 T^2}$

24. 30.5°API

25. C_P = 0.3840 + 4.659 × 10-4 T

26. a) 2.35 × 104

b) 1.2 × 104

27. $q = -8.624 \times 10^4 \frac{k A \Delta P}{\mu \Delta x}$

28. a) unitless

b) 0.901 m/s

M29. 26.2°API

M30. ρ = 988.0 kg/m^3 at 50.0°C