

Answers and hints: Tut 6

6.1 Plot the data in the format given in the notes. Note that you can draw a straight line through the data that goes through the origin.

- a) Data shows no effect of internal external or gas liquid mass transfer for these small particle sizes. Make sure you understand how to get to the same conclusion.
- b) $\eta = 1$
- c) $k_c = 4.458 \times 10^{-3} \text{ m.s}^{-1}$

6.2

- a) From plain old mol balance: $-r_a = 0.159 \text{ mol.m}^{-3}\text{s}^{-1}$
- b) $k_L a_g = 0.03 \text{ s}^{-1}$
- c) $C_s = 13.15 \text{ mol.m}^{-3}$
- d) $\eta = 0.51$
- e) $C_s = 10.87 \text{ mol.m}^{-3}$
- f) $C_{cat} = 3.53 \text{ kg.m}^{-3}$

6.3

- a) $C_s = 20.94 \text{ mol.m}^{-3}$
- b) $\Omega = 0.255$
- c) $C_b = 40 \text{ mol.m}^{-3}$
- d) k_c increases due to more vigorous mixing, $k_{c,new} = 1.5 k_{c,old}$
- e) Assume $k_c \propto d_p^{-0.5}$ then $x = 100\%$

6.4

- a) 10% increase in rate
- b) 83% increase
- c) $x_a = 94\%$