

1.  $58/233 = 0.25\text{g/s}$
2.  $0.43/80 = 5.375 \times 10^{-3}\text{g/s}$
3.  $3000/210 = 14.29\text{g/s}$
4.  $41/2 = 21\text{g/s}$
5.  $48/97 = 0.5\text{cm}^3/\text{s}$
6.  $21/79 = 0.27\text{g/s}$
7.  $480/1300 = 0.4\text{g/s}$
8.  $3100/95 = 32.63\text{g/s}$
9.  $845/450 = 1.88\text{g/s}$
10.  $21000/600 = 35\text{g/s}$
11.  $19000/54.12 = 351.07\text{g/s}$
12.  $641/(60 \times 55) = 0.19\text{cm}^3/\text{s}$
13.  $3100/7200 = 0.43\text{g/s}$
14.  $4119/18000 = 0.23\text{g/s}$
15.  $36/50 = 0.72\text{cm}^3/\text{s}$
16.  $14/10 = 1.4\text{cm}^3/\text{s}$
17.  $40/300 = .13\text{cm}^3/\text{s}$
18.  $22/50 = 0.44\text{cm}^3/\text{s}$
19.  $29/80 = 0.36\text{cm}^3/\text{s}$
20.  $10/20 = 0.5\text{cm}^3/\text{s}$
21. First reaction:  $37/60 = 0.62\text{cm}^3/\text{s}$   
Second reaction:  $24/60 = 0.4\text{cm}^3/\text{s}$  difference =  
 $0.22\text{cm}^3/\text{s}$
22.  $(40/200) - (40/200) = 0\text{cm}^3/\text{s}$

23.

24. 4.5mins

25.  $(102.8-99.2)/300 = 0.012\text{g/s}$

26.  $(102.8-99)/600 = 0.0063\text{g/s}$  or  $0.01\text{g/s}$

27.

a.  $(99.2-99)/300 = 0.0007\text{g/s}$

b.  $(99-99)/180 = 0\text{g/s}$

c.  $(102.8-99)/450 = 0.01\text{g/s}$

d.  $(100.3-99)/360 = 0.00361\text{g/s}$

e.  $(100.3-99.75)/60 = 0.01\text{g/s}$

f.  $(102.8-101.3)/60 - (99-99)/60 = 0.03\text{g/s}$

37.  $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$

Use gas collection or balance

38.  $\text{Na}_2\text{S}_2\text{O}_3 + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{H}_2\text{O} + \text{SO}_2 + \text{S}$

Disappearing cross, gas collection, balance

39. Calcium carbonate + sulphuric acid  $\rightarrow$  calcium

sulphate + water + carbon dioxide

balance or gas syringe

40.  $\text{PbNO}_3 + \text{KI} \rightarrow \text{KNO}_3 + \text{PbI}$

Disappearing cross

41.

a. Misses out increased frequency of collisions

- b. The wool would have greater rate as greater surface area so more frequent collisions
- c. Misses more frequent collisions and state that small marble chips have larger area etc

42.

- a. Steeper line
- b. Shallower line
- c. A has increased rate, b has decreased rate

43.  $(60-30)/(20-10) = 3\text{cm}^3/\text{s}$

44. Same as straight line

45.

- a.  $0.1\text{cm}^3/\text{s}$
- b.  $0.05-0.06\text{cm}^3/\text{s}$
- c. Steeper line but goes to the same point

46. Magnesium + hydrochloric acid  $\rightarrow$  magnesium chloride



47.  $\text{CH}_4 + 2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{CO}_2$

48. -270 (from memory needs checking)

49. Exothermic

50. Decreases

51. More space between particles, less frequent collisions

52. As the temperature increases, the rate increases (slowly at first then rapidly)
53. This is because as the temperature is increased, the particles move faster and collide more frequently. **Also**, a higher temperature means that more particles have the activation energy so more collisions result in a reaction.
54. Surface area, concentration, mass of reactant, volume of acid
55. Decrease rate due to smaller surface area, less frequent collisions
56. Increased rate, increased amount of product
57.  $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$
58. You have added oxygen atoms to the substance being weighed
59. As temperature increases, the mass increase increases until a point 42 degrees
60. Increase
61. Less space between particles, increased frequency of collisions
62. Increase
63. Increase surface area
64.  $14/(4 \times 60) = 0.06\text{g/s}$ ,  $14(3 \times 60) = 0.08\text{g/s}$
65. Catalysts are not used up in a reaction

66.  $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$
67. Oxygen in centre, two single bonds to hydrogen atoms
68. Two oxygen atoms with a double covalent bond
69. Increases it due to lowering the activation energy
70. B has a greater surface area so more frequent catalyst-reactant collisions