Quant booklet answers

1. –
	1. 28
	2. 40
	3. 34
	4. 64
	5. 62
	6. 102
	7. 78
	8. 148
	9. 159.5
	10. 174
	11. 342
2. - C6H6O6
	1. 263
	2. 408
3. –
	1. 24
	2. 36
	3. 3
	4. 54
	5. 288
	6. 1008
	7. 12
	8. 260
4. –
	1. 6.022x1023
	2. 1.2044x1024
	3. 4.2154x1024
	4. 3.011x1023
	5. 7.2264x1024
	6. 1.2044x1025
5. –
	1. 6.022x1023
	2. 6.022x1023
	3. 1.5055x1024
6. Given
	1. 1.8066x1024
	2. 7.2264x1024
	3. 1.32484x1025
	4. 3.011x1024
7. 31
8. –
	1. 2.96
	2. 2.08
	3. 2.44
	4. 1.30
	5. 1.34
	6. 0.81
	7. 1.06
	8. 0.56
	9. 0.52
	10. 0.48
	11. 0.24
9. –
	1. 355g
	2. 20.4g
	3. 1.08g
	4. 0.264g
	5. 31.8g
10. 176.06
11. –
	1. 7
	2. 14
	3. 100
	4. 117
	5. 15
	6. 2
	7. 4
	8. 1.004x1023
12. –
	1. 48
	2. 306
	3. 138
13. –
	1. 6
	2. 28
	3. 63
	4. 22
14. –
	1. 132
	2. 165
	3. 36
	4. 289
15. –
	1. CH4 + 2O2 🡪 CO2 + 2H2O
	2. 12 moles O2
	3. 12 moles water
16. –
	1. 2C2H6 + 7O2 🡪 4CO2 + 6H2O
	2. 4 moles CO2
	3. 21 moles H2O
	4. 16.29 moles H2O
	5. 14.33 moles of C2H6 and 50.17 moles O2
17. –
	1. S8 + 12O2 🡪 8SO3
	2. 1.5 moles S8
	3. 204 moles O2
	4. 136 moles SO3
18. –
	1. 115.14g
	2. 123.16g
	3. 23.42g
19. –
	1. 107.14g
	2. 1400g
	3. 2.87g
20. –
	1. 98.48g
	2. 37.28g
	3. 50.70g
21. –
	1. 3863.89g
	2. 151.86g
22. –
	1. 7.33g
	2. 0.38g
23. 16.55g
24. 2KNO3 🡪 2KNO2 + O2
25. 2Fe2O3 + 3C 🡪 4Fe + 3CO2
26. X = 4, y = 10
27. –
	1. N2 3H2 🡪 2NH3
	2. –
		1. N2 is excess, H2 is limiting
		2. H2 limiting
		3. N2 limiting
	3. –
		1. H2 limiting, 2 moles NH3 produced
		2. N­2 limiting, 6 moles NH3 produced
		3. N2 limiting, 1 mole NH3 produced
28. –
	1. 2SO2 + O2 🡪 2SO3
	2. –
		1. SO2 limiting
		2. SO2 limiting
		3. O2 limiting
29. Fe limiting
30. CaO limiting
	1. O2 limiting
	2. 13.75g
	3. Fe limiting
	4. 72.21g
31. Mg limiting, mass of Ti = 100g
32. SO2 limiting, 1250g SO3 produced
33. NaOCl limiting, 42.95g N2H4
34. All in dm3
	1. 0.01
	2. 0.1
	3. 0.2
	4. 0.00003
	5. 0.73
	6. 1.9
35. All in cm3
	1. 1000
	2. 10,000
	3. 70,000
	4. 800
36. All in g/dm3
	1. 114.29
	2. 1298.70
	3. 4
	4. 115.38
37. All in g/dm3
	1. 1095
	2. 1514.67
	3. 840
	4. 303.61
38. All in dm3
	1. 2.44
	2. 830
	3. 1
	4. 1.05
39. All in g
	1. 0.0575
	2. 17.75
	3. 140.3
40. 2Al(OH)3 + 3H2SO4 🡪 Al2(SO4)3 + 6H2O
41. 778.81g/dm3
42. 0.449 moles
43. 0.224 moles
44. 4.41g
45. H2SO4 limiting

Summary problem

1. 3Na + AlCl3 🡪 3NaCl + Al
2. Reactants: sodium, aluminium chloride, Products: sodium chloride, aluminium
Elements: sodium, aluminium, compounds aluminium chloride and sodium chloride
3. When a more reactive element takes the place of a less reactive element in a compound
4. That sodium is more reactive than aluminium
5. –
	1. Sodium: 2,8,1
	Potassium: 2,8,8,1
	2. Potassium has more shells
	Outer electron further away from the nucleus
	More shielding
	Weaker electrostatic force of attraction nucleus 🡪 outer shell
	Easier to lose the electron
6. It is a metal
Positive ions (in layers)
With delocalised electrons
Which can move and carry charge
7. It is a giant ionic lattice
Ions are fixed in positions
Not free to move and carry charge
8. Dissolve it in water or melt it
9. Ions are free to move
and carry charge
10. –
	1. Simple molecular/covalent/small molecules
	covalent bonds between chlorine atoms
	intermolecular force between molecules
	2. Two electrons in the bond, one from each chlorine, must be shared (only outer shell required)
	3. It is a simple molecular substance
	Weak intermolecular forces between molecules
	Does not require a lot of energy to break
	4. Giant ionic lattice
	aluminium ions and chloride ions held together by the electrostatic force of attraction
	Which is strong
	requires a lot of energy to break
11. Aluminium loses three electrons, gives one to each of three chlorine atom
12. Aluminium needs to lose three electrons but sodium only loses one
13. Na+, Al3+
14. 10
15. 150
16. 6.022x1024
17. Na: 23, AlCl3: 133.5, NaCl: 58.5, Al: 27
18. Ratio
Na:AlCl3
3:1
1:1/3
5:1.667
5 moles Na requires 1.667 moles AlCl3, but I have 5 moles so it is in excess and Na is limiting
19. 30g Na 🡪 moles = mass/Mr = 30/23 = 1.3
25g AlCl3 🡪 moles = mass/ Mr = 25/133.5 = 0.18
Na:AlCl3
3:1
1:1/3
1.3:0.43
I need 0.43 moles aluminium chloride, I have 0.18 so it is limiting
20. –
	1. Moles = mass/Mr = 90/23 = 3.9
	3:1
	1:1/3
	3.9:1.3
	Mass = moles x Mr = 1.3x27 = 35.1g
	2. 1.3 moles
	Mass = moles x Mr = 1.3 x 133.5 = 173.55g
	3. 3.9 moles NaCl
	mass = moles x Mr = 3.9 x 58.5 = 228.15g