Answers to Unit 1.1 Exercises

Topic 1 Exercise 1

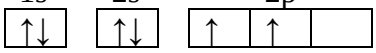
1. 1p, 0n, 1e
2. 8p, 9n, 8e
3. 2p, 2n, 0e
4. 54p, 78n, 54e
5. 13p, 14n, 10e
6. 92p, 143n, 92e
7. 1p, 0n, 0e
8. 21p, 24n, 18e
9. 17p, 20n, 18e
10. 6p, 8n, 6e
11. $^{39}K^{+}$
12. $^{16}O^{2-}$
13. ^{3}H
14. $^{208}Pb^{2+}$
15. $^{127}I^{-}$

Topic 1 Exercise 2

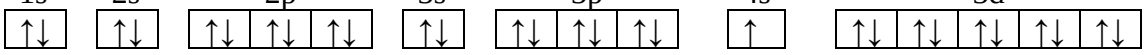
1. 28.29
2. 107.96
3. 10.85
4. 69.80
5. 91.4 (approx)
6. two isotopes approximately equally abundant
7. 22 neutrons. Other isotopes are lighter, and not very abundant
8. a) high voltage supply removed electrons
   b) electric field – attracts ions towards it until all have the same kinetic energy
   c) ion drift – heavier particles move more slowly than lighter particles with the same energy
   d) detector – ions land on it and create current proportional to abundance
9. 72 – peak with largest m/z ratio must be molecular ion peak

Topic 1 Exercise 3

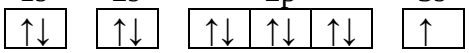
1. 1s 2s 2p



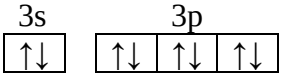
2. 1s 2s 2p 3s 3p 4s 3d



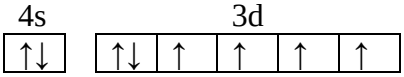
3. 1s 2s 2p 3s



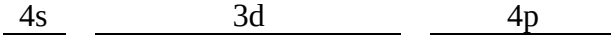
4. $1s^2 2s^2 2p^6$
5. $1s^2 2s^2 2p^6 3s^2 3p^6$
6. $1s^2 2s^2 2p^6 3s^2 3p^6$
7. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$
8. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$
9. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2$
10. [Ne] 3s 3p

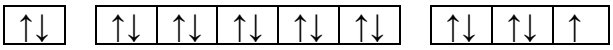


11. [Ar] 4s 3d



12. 4s 3d 4p



[Ar] 

13. $[Ar]4s^1 3d^5$ 14. $[Ar]3d^{10}$ 15. $[Xe]\ 6s^2 4f^{14} 5d^{10}$

Topic 1 Exercise 4

1. Number of protons increases, shielding stays the same, so attraction of outer electrons to nucleus increases
2. Outermost electron in B is 2p, outermost electron in Be is 2s, 2p electron in B better shielded than 2s electron in Be, so it is less attracted to nucleus
3. 2p electron is paired in O but unpaired in N, so in O there is more repulsion in the orbital which makes the electron easier to remove
4. More shells, so more shielding, so attraction of outer electrons to the nucleus decreases
5. No shielding in 1st period so electrons closely held than in other periods, and more protons than hydrogen so greater attraction to nucleus
6. Less electrons, so less electron repulsion
7. 1st electron removed from 3s, second electron removed from 2p so much less shielding
8. Number of protons increases, shielding stays the same, so attraction of outer electrons to nucleus increases and they move closer
9. More shells, so more shielding, so attraction of outer electrons to the nucleus decreases and they are pushed further away
10. Less electrons, so less repulsion, so electrons can get closer to the nucleus
11. More electrons, so more repulsion, so electrons are pushed further away