01. 0620_m21_ms_42 Q: 1

Question	Answer	Marks
(a)(i)	E	1
(a)(ii)	A I	2
(a)(iii)	D G	2
(a)(iv)	F	1
(a)(v)	H	1
(v)(i)	G **and** I	1
(v)(ii)	A	1
(v)(iii)	B	1
(b)	same proton number different neutron number	2

02. 0620_s21_ms_41 Q: 2

Question	Answer	Marks
	Mg: 12 **and** 13 (1) Cu^{2+}: 29 **and** 27 (1) 37(**above**) **and**17(**below**) (1) *Cl* (1) 1– (1)	5

03. 0620_s21_ms_43 Q: 2

Question	Answer	Marks
	B: 5 and 6 (1) Cl^-: 18 and 18 (1) 54 and 24 (1) Cr (1) 3^+ (1)	5

04. 0620_w21_ms_42 Q: 3

Question	Answer	Marks
(a)	1 mark for each correct row Name / Relative mass / Relative charge Proton / 1 / +1 Neutron / 1 / 0 Electron / 1 / 1840 / –1	3
(b)	Particle / Number of protons / Number of neutrons / Number of electrons $^{32}_{16}S$ / 16 / 16 / 16 $^{39}_{19}K^{+}$ / 19 / 20 / 18 $^{79}_{35}Br^{-}$ / 35 / 44 / 36 M1 = row 1 (1) M2 = row 2 (1) M3 =Br (1) M4 = $^{79}_{35}$ (on left of any symbol) (1) M5 = charge (on any symbol) (1)	5

05. 0620_p20_ms_40 Q: 2

(a) (i) same number of protons and electrons [1]

(ii) all have the same number of protons / same proton number / same atomic number [1]

(iii) same number of protons / same proton number / same atomic number; [1]
different number of neutrons / different nucleon number / different mass number; [1]

(b) (i) 2, 8, 5 [1]

(ii) non-metal because it accepts electrons / needs 3e to complete outer energy level / because it is in Group V or 5e in outer shell [1]
note: need both non-metal and reason for one mark

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06. 0620_w20_ms_42 Q: 1

Question	Answer	Marks
(a)(i)	A (1) H (1)	2
(a)(ii)	B	1
(a)(iii)	D	1
(a)(iv	C **and** G **OR** C **and** E	1
(b)	F (1) third / outer shell is being filled before second shell is full; second shell has 6 electrons: it should have 8 electrons (1)	2
(c)	12	1
(d)(i)	H^{-}	1
(d)(ii)	aluminium / A*l*	1

07. 0620_w20_ms_43 Q: 2

Question	Answer	Marks
(a)	11	1
(b)	38	1
(c)	2,8,8	1
(d)(i)	B, C and E	1
(d)(ii)	A	1
(d)(iii)	D	1
(d)(iv)	B and C	1

08. 0620_m19_ms_42 Q: 2

(a)	<table><tr><th>number of protons</th><th>electrons</th><th>electronic structure</th><th>charge on particle</th></tr><tr><td>11</td><td>10</td><td>2,8</td><td>**M4 1+ / +1(1)**</td></tr><tr><td>**M1 18(1)**</td><td>18</td><td>**M3 2,8,8(1)**</td><td>0</td></tr><tr><td>**M2 9(1)**</td><td>10</td><td>2,8</td><td>1-</td></tr></table>	4
(b)(i)	*element* **EITHER** (substance) made of **atoms** with the same atomic number / number of protons / proton number **OR** a substance that cannot be split up / broken down into two or more simple(r) substances by chemical means	1
(b)(ii)	**M1** 6 protons in all three rows(1) **M2** 6,7 and 8 neutrons(1)	2

09. 0620_s19_ms_41 Q: 1

(a)	number of protons (1) protons in the nucleus (of an atom) (1)	2
(b)(i)	12p 12n 12e (1) 12p 14n 12e (1)	2
(b)(ii)	isotope(s)	1
(b)(iii)	same number of electrons (1) (same number) of electrons in the outer shell (1)	2
(c)	$^{9}_{4}Be$ any element symbol with a single negative charge (1) use of *Cl* (1) use of $^{37}_{17}$ (1)	4
(d)	2 8 3 (1) 2 8 8 (1)	2

10. 0620_s19_ms_43 Q: 1

(a)	<table><tr><th>particle</th><th>where found in an atom</th><th>relative mass</th><th>relative charge</th></tr><tr><td>electron</td><td>orbiting nucleus</td><td>1/1840</td><td>–1</td></tr><tr><td>proton</td><td>(in the) nucleus</td><td>1</td><td>+1</td></tr><tr><td>neutron</td><td>in the nucleus</td><td>1</td><td>0 / nil</td></tr></table>	3
(b)	**M1** electrons **18** **M2** neutrons **24** **M3** protons **20**	3

11. 0620_w19_ms_43 Q: 1

(a)	<table><tr><th>particle</th><th>charge</th><th>relative mass</th></tr><tr><td>electron</td><td>**M1** –1</td><td></td></tr><tr><td>neutron</td><td>**M2** 0</td><td>**M3** 1</td></tr><tr><td>proton</td><td></td><td>**M4** 1</td></tr></table> (1) (1) **Mark by column**	**2**
(b)	<table><tr><th>number of electrons</th><th>number of neutrons</th><th>number of protons</th><th>symbol</th></tr><tr><td>**M1** 13 (1)</td><td></td><td></td><td></td></tr><tr><td>**M2** 10 (1)</td><td>**M3** 13 (1)</td><td></td><td></td></tr><tr><td></td><td></td><td></td><td>**M4** 19 9 (1) **M5** F (1) **M6** – (1)</td></tr></table>	**6**

12. 0620_s18_ms_42 Q: 3

	<table><tr><th>particles</th><th>number of protons</th><th>number of electrons</th><th>number of neutrons</th><th>number of nucleons</th></tr><tr><td></td><td></td><td></td><td>12 (1)</td><td></td></tr><tr><td></td><td>17 (1)</td><td>18 (1)</td><td></td><td>37 (1)</td></tr><tr><td>Fe (1) 2+ (1)</td><td></td><td></td><td></td><td></td></tr></table>	**6**

13. 0620_s17_ms_43 Q: 1

(a)(i)	**J**	**1**
(a)(ii)	**E**	**1**
(a)(iii)	**D**	**1**
(a)(iv)	**J**	**1**
(a)(v)	**L**	**1**
(a)(vi)	**D**	**1**
(b)(i)	(atoms with) same **number** of protons / atomic number / of same element	**1**
	different **number** of neutrons / different mass number / different nucleon number	**1**
(b)(ii)	**E AND G**	**1**
(b)(iii)	they have the same number of electrons in their outer shell	**1**

14. 0620_w17_ms_41 Q: 1

(a)(i)	**B**	**1**
(a)(ii)	**A**	**1**
(a)(iii)	**C**	**1**
(a)(iv)	**E**	**1**
(b)	O^{2-} **M1** O **M2** $^{2-}$	**2**

15. 0620_w17_ms_43 Q: 1

(a)	mixture	1
(b)	element	1
(c)	compound	1
(d)	mixture	1

16. 0620_w17_ms_43 Q: 2

(a)(i)	(two or more) **atoms**	1
	combined / joined / sharing electrons (by a covalent bond) / bonded	1
(a)(ii)	substance that cannot be split up / broken down / decomposed (into anything simpler) **OR** (substance) made of **atoms** with the same atomic number / number of protons / proton number	1
(b)(i)	10	1
(b)(ii)	22	1
(b)(iii)	A **AND** B	1
(b)(iv)	A **AND** B	1
(b)(v)	C **AND** D	1
(c)	<table><tr><th></th><th>number of protons</th><th>number of electrons</th></tr><tr><td>Na</td><td>11</td><td>11</td></tr><tr><td>S^{2-}</td><td>16</td><td>18</td></tr><tr><td>Cl_2</td><td>34</td><td>34</td></tr></table>	3

17. 0620_m16_ms_42 Q: 1

(a)	B = 17; C = 18; D = 2,8; 2^- / $^-2$;	4
(b)	Substance that cannot be broken down into anything simpler / substance that cannot be broken down (by chemical means) / substance containing **atoms** with the same atomic number or proton number;	1
(c)	<table><tr><th>number of protons</th><th>number of neutrons</th><th>number of electrons</th></tr><tr><td>31</td><td>38</td><td>31</td></tr><tr><td>31</td><td>40</td><td>31</td></tr></table>**M1** column one; **M2** column two; **M3** column three;	3

18. 0620_p16_ms_40 Q: 2

(a) (i) same number of protons and electrons [1]

(ii) all have the same number of protons / same proton number / same atomic number [1]

(iii) same number of protons / same proton number / same atomic number; [1]
different number of neutrons / different nucleon number / different mass number; [1]

(b) (i) 2, 8, 5 [1]

(ii) non-metal because it accepts electrons / needs 3e to complete outer energy level / because it is in Group V or 5e in outer shell [1]
note: need both non-metal and reason for one mark

19. 0620_s16_ms_41 Q: 1

(a)	<table><tr><th>particle</th><th>relative mass</th><th>relative charge</th></tr><tr><td>proton</td><td>1</td><td>+1</td></tr><tr><td>neutron</td><td>1</td><td>nil</td></tr><tr><td>electron</td><td>1/1840</td><td>–1</td></tr></table>	3
(b)(i)	**M1** atom(s) of the same element; **M2** with different number of neutrons;	2 1 1
(b)(ii)	**M1** (both have) the same number of electrons; **M2** in the outer shell;	2 1 1
(c)	<table><tr><th>particle</th><th>number of protons</th><th>number of neutrons</th><th>number of electrons</th></tr><tr><td>$^{7}_{3}Li$</td><td>3</td><td>4</td><td>3</td></tr><tr><td>$^{34}_{16}S^{2-}$</td><td>16</td><td>18</td><td>18</td></tr><tr><td>$^{41}_{19}K^{+}$</td><td>19</td><td>22</td><td>18</td></tr></table>	5

20. 0620_s16_ms_42 Q: 2

(a)(i)	number of protons in one atom of an element;	1
(a)(ii)	**M1** number of protons and neutrons in one atom of an element; **M2** in one atom of an element;	2 1 1
(b)	<table><tr><td>A</td><td>6</td><td>6</td><td>6</td><td>$^{12}_{6}C$</td></tr><tr><td>B</td><td>12</td><td>12</td><td>12</td><td>$^{24}_{12}Mg$;</td></tr><tr><td>C</td><td>8</td><td>10;</td><td>8;</td><td>$^{16}_{8}O^{2-}$</td></tr><tr><td>D</td><td>11</td><td>10</td><td>13</td><td>$^{24}_{11}Na^{+}$ 11, 24; Na;+;</td></tr></table>	6

21. 0620_m15_ms_32 Q: 2

(a) Atoms of the same element / atoms with same proton number / atoms with same atomic number [1]

different neutron number / nucleon number / mass number [1]

(b)

particle	number of protons	number of electrons	number of neutrons	nucleon number	symbol or formula
A					
B				23 (1)	Na(1) $^{+}$(1)
C		10(1)		16(1)	
D	13 (1)		15 (1)		

[7]

[Total:9]

22. 0620_s15_ms_32 Q: 1

	$^{39}_{19}K$; 26p 26e 30n All three for 1 mark; $^{7}_{3}Li^{+}$ numbers and symbol; charge +; 31p 28e 39n All three for 2 marks, any two for 1 mark; $^{79}_{34}Se^{2-}$ numbers and symbol; charge 2^{-};	8	

23. 0620_w15_ms_31 Q: 1

(a)(i)	Na^{+}/sodium **and** O^{2-}/oxide;	1
(a)(ii)	Ca^{2+}/calcium;	1
(a)(iii)	P/phosphorus;	1
(a)(iv)	Si/silicon;	1
(b)(i)	• *number of protons* = 29; • *number of neutrons* = 35; • *number of electrons* = 27; three correct = [2]; two correct = [1]	2
(b)(iii)	*number of nucleons* = 45; *number of charged particles* = 42;	1 1
(c)(i)	have same proton number/same element/same atomic number; different number of neutrons/nucleons/mass number;	1 1
(c)(ii)	magnesium/Mg;	1
(c)(iii)	any two from: • treating cancer or radiotherapy; • biological tracer; • thickness (of paper or foil); • (checking for) leaks/cracks (in pipes); • (carbon) dating; • (generating) energy/electricity; • smoke detectors; • fill levels in packages; • sterilising surgical instruments;	2

24. 0620_s14_ms_31 Q: 1

(a) A, D, E (1)

same number of protons and electrons/electrically neutral (1) [2]

(b) C (1)

more electrons than protons/$36e^{-}$ and $34p^{+}$/it has gained electrons (1) [2]

(c) B, F (1) [1]

(d) they have same number of protons (1)

different number of neutrons/neutron number (1) [2]

[Total: 7]

25. 0620_s13_ms_32 Q: 2

(a) B $^{39}_{19}K$ [1]
positive charge + [1]

C $^{65}_{30}Zn$ [1]

D $^{16}_{8}O$ [1]
charge 2– [1]

E $^{70}_{31}Ga$ [1]

(b) number of p = number of e [1]

number of p > number of e [1]

number of p < number of e [1]