

The periodic table

1.	(a)	(i)	Y or 2,8,8 or Argon or Ar	All correct gains 3 marks	3	
		(ii)	W or 2,5	3 correct gains 1 mark		
		(iii)	X or 2,7 or fluorine or F	2 or 1 correct gains 1 mark		
		(iv)	Z or 2,8,8,1 or potassium or K			
			<i>N.B. number of ticks on script must equal number of marks</i>			
	(b)		1 and 2 (both needed)		1	
			<i>do not credit if any other group listed</i>			
			<i>'transition metals' neutral</i>			
			<i>allow alkali metals and alkali earth metals</i>			
						[4]
2.	(a)	(i)	elements		1	
		(ii)	atomic weight		1	
		(iii)	atomic (proton) number		1	
	(b)	(i)	transition metals		1	
		(ii)	has a higher melting point is harder		1	
						[6]
3.	(a)		B		1	
	(b)		eg link between Li, Na, K, (Rb, Cs)			
			or Mg, Ca, (Sr, Ba)			
			or F, Cl, Br, I		1	
			<i>allow any <b>two</b> elements in the same group (in both Newland's and the modern periodic table)</i>			
			linked appropriate comment about that link eg similar physical / chemical properties or similar specific reactions or same number of outer electrons		1	
			<i>if no elements identified, allow 1 mark for a general comment about elements <b>in the same column</b> having similar properties</i>			
			<i>"every eighth element has similar properties" = 1 mark</i>			
	(c)		any <b>two</b> from:			
			• no gaps for undiscovered elements or elements still being discovered			
			• some boxes have 2 elements			
			• metals and non-metals in same column / mixed up / some elements in the same column had different properties			
			• pattern for first 16 or so elements only			
			• any sensible suggestion about misplaced elements eg copper in group 1 metals		2	
	(d)		alkanes are not elements or alkanes are compounds		1	
			<i>ignore molecule / molecular</i>			
						[6]

4. (a) (i) undiscovered elements owtte 1
- (ii) they would be in the wrong group / have the wrong / different properties / don't fit the pattern owtte 1  
*allow atomic weights may have been wrong*
- (b) (i) any three from: 3
- elements arranged in proton / atomic number order  
*ignore mass number / atomic weight / neutrons throughout*
  - group: elements in the same group / column have same number of outer electrons owtte
  - group: number of shells increase down group
  - period: elements in the same period / row have the same number of shells / energy levels
  - period: number of protons / electrons increase across period
  - atomic number: link of atomic number to number of protons
  - atomic number gives number of electrons
- (ii) it would mean splitting a proton / electron
- or**
- implication of splitting proton / electron 1
- (c) must be a comparison
- (outer) electron closer (to nucleus) 1  
*accept fewer (electron) shells / energy levels*  
*fluorine is the smaller/est*
- stronger/est attraction (to nucleus) owtte 1  
*do **not** allow magnetic / intermolecular forces*
- or**
- less screening (by inner electrons)
- electron gained more easily 1  
*need some indication of outer electron shell somewhere in explanation otherwise max of 2 marks*
- [9]
5. chlorine atom smaller than bromine atom / has fewer shells / chlorine is higher in the group than bromine so it is more reactive 3
- the outer electron / extra electron is more strongly attracted with chlorine than bromine / bromide (owtte) /more shielding with bromine / less shielding with chlorine
- an extra electron is more easily gained by chlorine
- or**
- chlorine can take an electron from bromide ion (*not* bromine)  
*for 1 mark each*
- [3]

6. (a) same number of electrons in outer shell/ 1 / an electron in outer shell / lose one electron 1  
*for 1 mark*
- (b) (i) C 1  
*for 1 mark*
- (ii) E 1  
*for 1 mark*
- (c) (i)  $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$  2  
 symbols must be correct  
 correct multiples / fractions accepted  
 Balancing mark is independent  
*formulae gains 1 mark*  
*balancing gains 1 mark*
- (ii) Assume 'it' means potassium 4  
 potassium more reactive / vigorous / faster reaction / violent (can be awarded in either section)  
 potassium atom larger than sodium / higher outer energy level / outer shell further from nucleus / more shells (not just more electrons)  
 electron in outer shell is less strongly attracted / greater shielding  
 outer electron more easily lost  
*for 1 mark each*

[9]

7. (a) Mendeleev arranged known elements in order of mass or properties 1  
*reject explanation in terms of electrons and / or atomic number*  
 gaps in Periodic Table / group 1 1
- (b) does not last long enough to experiment / very little of it 1  
*allow it has a short half-life*
- (c) (i) (much) more violent 1  
*accept more reactive*
- (ii) since outer electron / or shell further from nucleus 1  
*do not credit lower down group larger / more shells neutral*  
 therefore more easily lost 1  
*accept screening by inner electrons*

[6]