



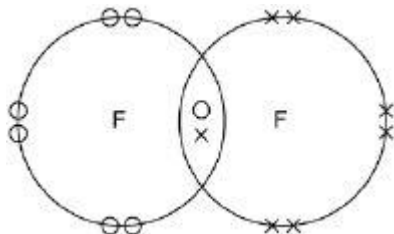
## Mark schemes

### Q1.

(a) group 7

1

(b)



*one shared pair anywhere in overlap between two circles **or** on intersection*

*6 other electrons on each atom*

*allow dots **or** crosses **or** mixture for all marks*

*ignore any inner shell electrons*

1

1

(c) bromine

1

potassium chloride

1

*either order*

*allow correct chemical formulae*

(d) displacement

1

(e) (an) electron

1

(f) smaller than

1

(g) (chlorine has) fewer levels / shells (of electrons)

*allow converse for bromine*

*allow (chlorine has) fewer electrons*

*allow Cl has 3 levels / shells and Br has 4 levels / shells*

*ignore atomic number*

***or** mass number*

***or** number of protons*

1

*mark independent of answer to part (f)*

(h) 3

*allow multiples*

1

- (i) there are weak forces  
*do **not** accept weak bonds* 1
- between molecules 1
- allow weak intermolecular forces for the first 2 marks*
- which require little energy to overcome / break  
*allow does not need much energy to boil* 1

[13]

**Q2.**

- (a) (i) electronic structure 2,3 drawn  
*allow any representation of electrons, such as, dots, crosses, or numbers (2,3)* 1
- (ii) nucleus 1
- (iii) protons and neutrons  
*do **not** allow electrons in nucleus* 1
- (relative charge of proton) +1  
*allow positive* 1
- (relative charge of neutron) 0  
*allow no charge/neutral* 1
- ignore number of particles*
- (b) too many electrons in the first energy level or inner shell  
*allow inner shell can only have a maximum of 2 electrons* 1
- too few electrons in the second energy level or outer shell  
*allow neon has 8 electrons in its outer shell **or** neon does not have 1 electron in its outer shell*  
*allow neon has a stable arrangement of electrons or a full outer shell* 1
- neon does not have 9 electrons **or** neon has 10 electrons  
*allow one electron missing*  
*allow fluorine has 9 electrons* 1
- ignore second shell can hold (maximum) 8 electrons or 2,8,8 rule or is a noble gas or in Group 0*

*max 2 marks if the wrong particle, such as atoms instead of electrons*

*if no other mark awarded allow 1 mark for the electronic structure of neon is 2,8*

[8]

**Q3.**

- (a) (i) Na  
*allow sodium / phonetic spelling*  
*if more than one answer is given apply list principle* 1
- (ii) Fe  
*allow iron / phonetic spelling*  
*if more than one answer is given apply list principle* 1
- (iii) Na or S  
*allow sodium or sulfur / sulphur / phonetic spelling*  
*if more than one answer is given apply list principle* 1
- (iv) S  
*allow sulfur / sulphur / phonetic spelling*  
*if more than one answer is given apply list principle* 1
- (v) Na  
*allow sodium / phonetic spelling*  
*if more than one answer is given apply list principle* 1
- (b) (i) any **three** from:
- effervescence / fizzing **or** bubbles **or** gas produced  
*do not allow incorrectly named gas*
  - sodium melts **or** turns into a ball
  - sodium moves (on the surface)
  - steam / mist / vapour is produced  
*ignore heat / temperature / flame / spark*
  - sodium gets smaller / disappears  
*allow dissolves*
  - colour of indicator is darker / more intense near the sodium  
*Must be linked to near the sodium.*
- 3
- (ii) hydroxide **or** OH<sup>-</sup>  
*allow OH without a charge*  
*do not allow OH<sup>+</sup>* 1

(c)

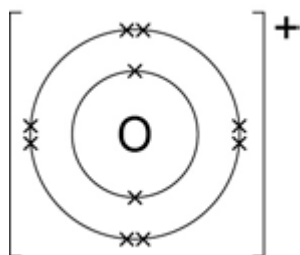


diagram showing electron configuration of ion is 2,8

1

charge on ion is +

Bracket not necessary

[2,8]<sup>+</sup> is worth 1 mark as there is no diagram

1

[11]

#### Q4.

(a) any **two** from:

- hydrogen is in a group  
*allow converse arguments*  
*allow hydrogen is with the halogens*
- only seven groups
- no group 0  
*allow no noble gases*
- halogens are in Group 1  
*allow fluorine and / or chlorine are in Group 1*
- other elements are in one group higher  
*allow one example of this*
- transition metals included in groups  
*allow one example, eg, iron in same group as aluminium*

2

(b) similar properties occur at regular intervals

1

(c) some elements appeared to be in the wrong group

1

(when) the elements were arranged in order of relative atomic mass

*allow (so) he placed them into groups with similar properties*

1

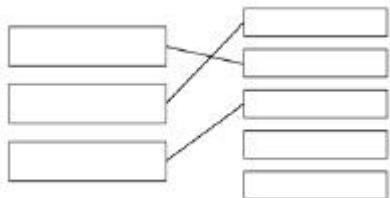
(d) most elements are mixtures of isotopes

1

(so) should be arranged in order of atomic number

1

(e)



1  
1  
1

[10]

**Q5.**

(a) ideas that

- hydrogen is in a group / is with the halogens
  - only seven groups / no group O / no noble gases / fewer elements
  - halogens are in the first group / Group 1
  - other elements are in one group higher (*or example*)
  - modern table only has two elements in the top row / period
  - modern table not in order of atomic weight/mass
  - metals and non-metals not at opposite ends
- (NB allow converse answers throughout)  
*any three for 1 mark each*

3

(b) ideas that

- all rows / periods are the same length / have seven elements
  - all elements had to be in one of the groups
  - he didn't know about the noble gases / not all the elements had been discovered
  - he didn't know about atomic/proton number/electron structure
  - he arranged elements in order of atomic weight/mass
- any one for 1 mark*

1

(c) (i) *ideas that*  
tellurium and iodine are in reverse order  
*for 1 mark*

1

(ii) elements are arranged in order of proton (atomic) number  
or based on electron structure/outer shell electrons

(so tellurium is correctly placed before iodine)

[tellurium = 'dead mark']

each for 1 mark

2

[7]

**Q6.**

- (a) react with oxygen / oxidise / burn in oxygen / burning / combustion **or** tungsten to tungsten oxide **or** makes an oxide

*key idea is oxidation*

*ignore breaking ignore fire / flames / exothermic*

*ignore react with air*

1

- (b) it is (very) unreactive / not reactive / inert / does not react with tungsten **or** it is a noble gas **or** it is in group 0 or 8 or 18

*do **not** accept unreactive / inert metal **or** argon is not very reactive*

1

full outer shell (of electrons) / 8 electrons in outer shell

1

does not need to gain / lose / swap / transfer / share electrons **or** does not need to form bonds

*does not bond ionically / covalently*

1

[4]