



# **GCSE Chemistry**

## **Group 7 Elements**

### **Mark Scheme**

**Time available: 57 minutes**

**Marks available: 55 marks**

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## Mark schemes

- 1.** (a) 7 1
- (b) small molecule 1
- (c) F<sub>2</sub> 1
- (d) the reactivity decreases (going down Group 7)  
*allow the reactivity decreases from chlorine to iodine* 1
- (because) chlorine displaces bromine and iodine  
*allow (because) chlorine has two reactions*  
*allow (because) neither bromine nor iodine can displace chlorine* 1
- (and) bromine displaces iodine **or** iodine does not react  
*allow (and) bromine has one reaction*  
**or** *iodine has no reactions*  
*allow (and) iodine cannot displace bromine* 1
- (e) 80 1
- (f) (1.2 kg =) 1200 (g)  
**or** (900 g =) 0.9 (kg) 1
- $$\left(\frac{900}{1200} \times 100\right) = 75(\%)$$
- or**
- $$\left(\frac{0.9}{1.2} \times 100\right) = 75(\%)$$
- allow an answer correctly calculated from:*
- $$\left(\frac{900}{\text{incorrect attempt at conversion of 1.2}} \times 100\right)$$
- or**
- $$\left(\frac{\text{conversion of 900}}{1.2} \times 100\right)$$
- an answer of 75 (%) scores 2 marks* 1

- 2.** (a) The forces between iodine molecules are stronger 1
- (b) anything in range +30 to +120 1
- (c) Brown 1
- (d)  $2 I^- + Cl_2 \rightarrow I_2 + 2 Cl^-$  1
- (e) It contains ions which can move 1
- (f) hydrogen iodine 1
- [6]**
- 3.** (a) potassium chloride **and** iodine  
*either order*  
*allow KCl for potassium chloride and I<sub>2</sub> for iodine* 1
- (b) (chlorine's) outer electrons / shell closer to the nucleus  
*allow chlorine has fewer shells*  
*allow chlorine atom is smaller than iodine atom*  
*ignore chlorine has fewer outer shells* 1
- (so) the chlorine nucleus has greater attraction for outer electrons / shell  
*allow chlorine has less shielding*  
*do **not** accept incorrect types of attraction* 1
- (so) chlorine gains an electron more easily 1
- max 2** marks can be awarded if the answer refers to chloride / iodide instead of chlorine / iodine*  
*allow converse statements*  
*allow energy levels for shells throughout*
- (c) hydrogen chloride is made of small molecules  
*allow hydrogen chloride is simple molecular* 1
- (so hydrogen chloride) has weak intermolecular forces\* 1
- (intermolecular forces) require little energy to overcome\* 1
- \*do **not** accept reference to bonds breaking unless applied to intermolecular bonds*

(d) (bonds broken =  $4(412) + 193 =$ )1841

1

(bonds formed =  $3(412) + 366 + X =$ )  $1602 + X$

1

$-51 = 1841 - (1602 + X)$

*allow use of incorrectly calculated values of bonds broken and / or bonds formed from steps 1 and 2 for steps 3 and 4*

1

$(X =) 290$  (kJ/mol)

*allow a correctly calculated answer from use of  $-51 =$  bonds formed – bonds broken*

1

**OR**

alternative method ignoring the 3 unchanged C–H bonds

$(412 + 193 =)$  605 (1)

$366 + X$  (1)

$-51 = 605 - (366 + X)$  (1)

$(X =) 290$  (kJ/mol) (1)

*an answer of 290 (kJ/mol) scores 4 marks  
an answer of 188 (kJ/mol) scores 3 marks  
an incorrect answer for one step does **not** prevent allocation of marks for subsequent steps*

[11]

4.

(a) increase

1

(b) (i)  $\text{Na}^+$  and  $\text{Br}^-$

*both required*

1

(ii) sodium chloride

*allow NaCl*

*do **not** allow sodium chlorine*

1

(iii) chlorine is more reactive than bromine

*allow converse argument*

*allow symbols Cl, Cl<sub>2</sub>, Br and Br<sub>2</sub>*

*allow chlorine / it is more reactive*

*do **not** allow chloride or bromide*

1

- (iv) fluorine  
*allow F / F<sub>2</sub>.*  
*do **not** allow fluoride.*

1

[5]

5.

- (a) (i) Halogens 1
- (ii) They consist of molecules 1
- They have coloured vapours 1
- (b) (i) 7 / seven 1
- (ii) liquid 1
- (iii) astatine  
*allow obvious mis-spelling*  
*ignore At* 1
- (c) chlorine reacts with (the) bromide [owtte] 1
- chlorine reacts with (the) iodide [owtte]  
*allow chlorine reacts with both*  
**or**  
*chlorine has more reactions for **2 marks***  
**or**  
*bromine reacts with one **and** iodine does not react at all for **2 marks*** 1

6.

- (a) any (must be named) 1
- (b) F<sub>2</sub> 1
- (c) -/F<sup>-</sup> 1
- (d) (i) covalent 1
- (ii) made of molecules etc.  
type of bonding when non-metals react. 1

[5]

7. (a) gas 1
- (b) -35 (°C) 1  
*allow any value between -35 °C and -100 °C*
- (c) increase 1  
 increase 1  
*allow become stronger*
- (d) chlorine gas is toxic 1
- (e) increased 1  
 chlorine (atoms) are now part of the solid (iron chloride)  
**or**  
 the mass of the chlorine (atoms) is now also measured 1
- (f) burns very vigorously 1  
*allow burns violently*  
*allow brighter (orange) glow*  
*allow (orange) flame*  
*allow explodes*
- (g)  $2 \text{ Fe} + 3 \text{ Br}_2 \rightarrow 2 \text{ FeBr}_3$  1  
*allow multiples*
- (h)  $56 + (3 \times 80)$  1  
 = 296 1  
*ignore units*
- [11]