AS-LEVEL PAPER 1 PP6 MS

**1.**       (a)                    Na                     Cl                      O

**1**

0.9(39)               0.9(38)               2.8(2)

Hence:     1                        1                      3  
Accept backwards calculation, i.e. from formula to % composition,  
and also accept route via *M*r to 23; 35.5; 48, and then to 1:1:3

*[If % values incorrectly copied, allow M1 only]*

*[If any wrong Arvalues/atomic numbers used = CE = 0]*

**1**

(b) 3Cl2 + 6NaOH → 5NaCl + NaClO3 + 3H2O

**1**

**[3]**

**2.**      Ionic

*If not ionic CE = 0/3*

**1**

Strong (electrostatic) attraction (between ions)

**1**

between oppositely charged ions / + and − ions / F− and Zn2+ ions

*If IMF, molecules, metallic bonding implied CE = 0/3*

**1**

**[3]**

**3.**       (a)     enthalpy/energy change/required when an electron is removed/  
 knocked out / displaced/ to form a uni-positive ion

*(ignore ‘minimum’ energy)*

**1**

from a gaseous atom

*(could get M2 from a correct equation here)  
(accept ‘Enthalpy/energy change for the process...’  
followed by an appropriate equation, for both marks)  
(accept molar definitions)*

**1**

(b)     Mg+(g) → Mg2+(g) + e– or

Mg+(g) + e– → Mg2+(g) + 2e– or

Mg+(g) – e– → Mg2+(g)

**1**

(c)     Mg2+ ion smaller than Ne atom / Mg2+ e– closer to nucleus

*(Not ‘atomic’ radius fo Mg2+)*

**1**

Mg2+ has more protons than Ne / higher nuclear charge or   
e– is removed from a charged Mg2+ion / neutral neon atom

*(accept converse arguments)*

*(If used ‘It’ or Mg/magnesium/Mg3+ etc. & 2 correct reasons, allow* ***(1)****)*

**1**

(d)      (i)      trend: increases

*(if ‘decreases’, CE = 0/3)*

**1**

Expln: more protons / increased proton number /  
increased nuclear charge

*(NOT increased atomic number)*

**1**

same shell / same shielding / smaller size

**1**

(ii)     QoL reference to the e– pair in the 3p sub-level

*(penalise if wrong shell, e.g. ‘2p’, quoted)*

**1**

repulsion between the e–in this e–pair

*(if not stated, ‘e– pair’ must be clearly implied)*

*(mark M4 and M5 separately)*

**1**

**[10]**

**4.**      (a)     removal/loss of electrons

**1**

(c)     (i)      +2

**1**

+5

**1**

(ii)     NO3– + 4H+ + 3e– → NO +2H2O

**1**

(iii)     Ag → Ag+ + e–

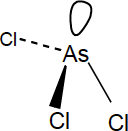
**1**

(iv)    NO3– + 4H+ + 3Ag → NO + 2H2O + 3Ag+

**1**

**[6]**

**5.** (a)



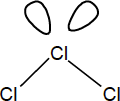
*Mark is for 3 As-Cl bonds and 1 lone pair*

**1**

(Trigonal) pyramid(al) / tetrahedral

*Allow triangular pyramid*

**1**



*Mark is for 2 Cl-Cl bonds and 2 lone pairs  
Do not penalise if + not shown*

**1**

Bent / V-shaped / triangular

*Not trigonal*

**1**

(b)     There are 4 bonds or 4 pairs of electrons (around As)

*Can show in a diagram. If lone pair included in shape, CE = 0 / 2*

**1**

(Electron pairs / bonds) repel equally

*QoL*

**1**

**[6]**

**6.**     (a)      Hydroxide        solubility increases            *(need trend)*

**1**

Sulphate          solubility decreases         *(need trend)*

*(If both Mg/Ba salts correctly compared - but no trend- allow 1 max)*

**1**

Add acid           name/correct formula       HCl

**1**

(b)      *(accept HNO3/CH3COOH)              [NOT hydrogen chloride]*

*[If acid added is H2SO4 = CE – allow only M2]*

          Add Ba2+ salt   name/correct formula BaCl2

*(accept Ba(NO3)2 / Ba(CH3COO)2)*

*[If reagent added is BaSO4 /Ba/Ba(OH)2 = CE – allow only M1]*

**1**

          MgCl2 No change / no ppt / no reaction

**1**

MgSO4         White ppt / solid / suspension *[NOT chalky, milky]*

*Both observations tied to Ba2+ ions being added*

**1**

          MgSO4 + BaCl2 → BaSO4 + MgCl2

*Accept ionic equation*

**1**

          (Reagent mark (M2) can be awarded from full equation)

**1**

          [Treat incorrect equation for MgCl2 as contradiction of correct equation]

*(Ignore carbonate equations)            (Ignore state symbols)*

**1**

(c)     Reactivity   increases (down group)         *[NOT solubility increases]*

**1**

          Ba + 2H2O → Ba(OH)2 + H2

**1**

**[11]**

**7.** (a)     Increase

**1**

Van der Waal’s forces between molecules

**1**

Increase with size (or *M*r or surface area etc)

**1**

More energy needed to break (overcome) these forces

*(Note max 2 from last three marks if no mention of molecules or ‘molecular’)*

**1**

(b)     (i)      Brown solution (or yellow or orange)

**1**

         Cl2 + 2Br → 2C1– + Br2

**1**

(ii)     cream precipitate

**1**

         Br– + Ag+ → AgBr

**1**

         Precipitate dissolves

**1**

(iii)     orange (brown) fumes (gas), White fumes (or misty fumes),  
choking gas (any 2)

**2**

(c)     2H+ + H2SO4+ 2Br– → SO2 + Br2 + 2H2O (SO2 and Br2 (1),  
equation (1))

**2**

**[13]**

|  |  |  |
| --- | --- | --- |
| **8.** | (a)  (b)  (c)  (d)  (e) |  |

|  |  |  |
| --- | --- | --- |
|  | (f)  (g)  (h) |  |

**9.** A

**[1]**

**10.** C

**[1]**

**11.** C

**[1]**

**12.** D

**[1]**

**13.** C

**[1]**

**14.** C

**[1]**

**15.** D

**[1]**

**16.** D

**[1]**

**17.** D

**[1]**

**18.** C

**[1]**

**19.** B

**[1]**

**20.** C

**[1]**

**21.** A

**[1]**

**22.** D