AS-LEVEL PAPER 1 PP4 MS

1. (a) (i)      Average/mean mass of 1 atom (of an element);

*Average mass of 1 atom × 12.*

**1**

         Mass 1/12 atom of 12C;

*Mass 1 atom of 12C.
QWC.*

**1**

(ii)     Other isotope = 46.0%;

**1**

         107.9 = ;

*M2 whole expression.*

**1**

         108.8;

*Answer 108.8 (3 marks).
Answer min 1 d.p..*

**1**

Same electronic configuration/ same number of electrons (in
outer shell)/ both have 47 electrons;

*Ignore protons and neutrons unless incorrect.
Not just electrons determine chemical properties.*

**1**

(b)     Ionisation;

**1**

          high energy electrons fired at sample;

*Allow electron gun /blasted with electrons.*

**1**

          Acceleration;

**1**

          With electric field/accelerating potential/potential difference;

*Allow by negative plate.*

**1**

          Deflection;

**1**

          With electromagnet/ magnet/ magnetic field;

*M2 dependent on M1.
M4 dependent on M3.
M6 dependent on M5.*

**1**

(c)     (Silver) metallic (bonding);

*Vdw/molecules CE=0.*

**1**

          Regular arrangement of same sized particles;

**1**

          + charge in each ion;

*Ignore multiple positive charges.
Candidates do not need to show delocalised electrons.*

**1**

(d)     Ionic (bonds);

**1**

          Minimum 4 ions shown in 2D square arrangement placed Correctly;

*Do not allow multiple charges on ions.*

**1**

          Further 3 ions shown correctly in a cubic lattice;

**1**

          Strong (electrostatic) forces/bonds;

*If vdw/molecules/covalent mentioned CE = 0 for M4 and M5.*

**1**

          Between + and – ions;

*Accept between oppositely charged ions.*

**1**

**[20]**

**2.** (a)      (i)     mol H2 = 0.47

**1**

mol I2 = 0.17

*If answers reversed, ie*

*mol H2 = 0.17*

*mol I2 = 0.47*

*then allow one mark (for second answer).*

**1**

(ii)     

Penalise expression containing V
But mark on in (a)(iv)

***Penalise missing square brackets*** *in this part(and not elsewhere in paper) but mark on in (a)(iv)*

**1**

(iii)    equal number of moles (on each side of equation)

***OR***

equal moles (top and bottom of *K*c expression)

**1**

(iv)     

Ignore V

*If Kc wrong in (a)(ii) (wrong powers or upside down etc) no marks here*

**1**

= 52(.1)

**1**

(b)    (i)      **D**

**1**

(ii)     **B**

**1**

(iii)    **A**

**1**

(iv)    **C**

**1**

**[10]**

**3.** (a)     M1  Increases / gets bigger

*If* ***M1*** *is incorrect* ***CE = 0*** *for the clip*

*If* ***M1*** *is blank, mark on and seek to* ***credit the correct information in the text***

**M2  requires a correct M1**

***M2*** *requires correct* ***M1***

More shells or sub-shells or (main) levels or sub-levels or orbitals (of electrons)

*If “molecules” penalise* ***M2***

*Not simply “more electrons”*

*Not “more outer shells”*

*Ignore reference to nuclear charge and shielding*

**2**

 (b)    (i)      Increases / gets more reactive / reacts more vigorously / violently (down the Group)

**1**

(ii)     Sr   +   2H2O         Sr(OH)2   +   H2

*Credit multiples and correct ionic equations*

*Ignore state symbols*

**1**

 (c)     Ba(OH)2

*This MUST be a formula so ignore the name*

*Credit Ba2+ 2OH−*

*Ignore state symbols*

**1**

**[5]**

**4.**     (a)     (i)      –2 OR 2–

(ii)     NaI or NaAt or I– or iodide or At–or Astatide **(1)**

*Not atoms or molecules*

(iii)     Smell of bad eggs **(1)**

*Allow PbAc2 goes black and K2Cr2O7/H+ goes
cloudy green*

(iv)    8 e– + 8 H+ + H2SO4 → H2S + 4H2O **(1)**

*OR 10 H+ +SO42–*

**4**

 (b)     (i)      HF or HCl **(1)**

*CE = 0 if redox answer given*

*If wrong halide given allow max one in b(iii)*

*If NaF or NaCl, or F– or Cl– given lose mark in (i)*

*Mark on if X is e.g. HF2 or H2F*

(ii)     NaF or NaCl or F– or Cl– **(1)**

(iii)     A proton donor or an acid **(1)**

(iv)    H+ +F– → HF

*OR H2SO4 + NaF → NaHSO4 + HF*

*OR H2SO4 + 2 NaF → Na2SO4 + 2 HF*

*OR for chloride*

**4**

**[8]**

# 5. (a) HA + NAOH 🡪 NaA + H2O (1)

 (b) 27.95 + 28.05 + 28.00

 3

 = 28 .00 cm3 (1)

(c) 1:1 reaction so moles of acid = 2.5 x 10-3

 conc = 2.5 x 10-3 /(28/1000)

 = 0.0893 mol dm-3 (1)

 (d) conc. original solution = 0.0893 x 10 = 0.893 mol dm-3

 conc. in gdm-3 = 0.893 x 60 = 53.6 gdm-3 (1)

 (e) (i) measuring cylinder (0.5/ 25) x 100 = 2.00%

 (ii) Volumetric flask (0.5/ 250) x 100 = 0.20%

 (iii) pipette (0.05 / 25) x 100 = 0.20%

 (iv) burette (0.15 / 28) x 100 = 0.54% (all 4 = 1)

 TOTAL = 2.94% (1)

 Precision: average titre to 2dp

 Both concentrations to 3 sf (1)

 Working: clear working

 Accurate use of terminology

 Correct units (1)

 (f) First titration poor / probably rough (1)

 Three good results/ concordant results

 Titration technique good/ results consistent (both = 1)

 (g) difference = 2.5

 = 4.5 % error (both = 1)

 (h) appreciates discrepancy (4.5%) is greater than total apparatus error (1)

 (i) Uses pipette/ burette for measuring supplier’s solution (1)

 As apparatus error is smaller (1)

**6.**

 

 

 

**7.** A

**[1]**

**8.** B

**[1]**

**9.** D

**[1]**

**10.** A

**[1]**

**11.** B

**[1]**

**12.** B

**[1]**

**13.** D

**[1]**

**14.** A

**[1]**

**15.** C

**[1]**

**16.** A

**[1]**

**17.** B

**[1]**

**18.** A

**[1]**

**19.** C

**[1]**

**20.** D

**[1]**

**21.** D

**[1]**