



# Basic Education

KwaZulu-Natal Department of Basic Education  
REPUBLIC OF SOUTH AFRICA

**PHYSICAL SCIENCES CHEMISTRY (P2)**

**COMMON TEST**

**MARCH 2016**

**NATIONAL SENIOR  
CERTIFICATE**

**GRADE 10**

**TIME: 1 hour**

**MARKS: 50**

**This question paper consists of 7 pages including 1 graph page and 1 data sheet.**

**QUESTION 1: MULTIPLE CHOICE**

Four possible options are provided as answers. Choose the correct option by writing only the letter next to the question number (1.1 – 1.5).

- 1.1 Liquids which mix homogeneously in all proportions are said to be ... .
- A suspensions
  - B miscible
  - C emulsions
  - D aerosols
- (2)
- 1.2 Solid carbon dioxide turns directly into a gas when heated. What is this process called?
- A Condensation
  - B Evaporation
  - C Sublimation
  - D Boiling
- (2)
- 1.3 The sum of the number of protons and neutrons in an atom gives its ... .
- A atomic number
  - B electronegativity
  - C electron affinity
  - D mass number
- (2)

**[6]**

**QUESTION 2**

Mixtures are a combination of two or more pure substances.

- 2.1 Name the two types of mixtures that can be formed. (2)
- 2.2 Explain the difference between the two types of mixtures. (2)
- 2.3 State the method by which each of the following mixtures can be separated.
- 2.3.1 Alcohol and water (1)
- 2.3.2 Oil and water (1)
- [6]**

**QUESTION 3**

Learners, wishing to investigate the effect of heat on water, placed some ice cubes in a beaker and allowed it to melt while resting on a table. Temperature readings were recorded every 5 minutes for 1 hour. The results are given in the table below.

Time in mins	0	5	10	15	20	25	30	35	40	45	50	55	60
Temperature in °C	-12	-8	-4	-2	0	0	0	2	6	10	14	18	22

- 3.1 Use the graph paper supplied to plot a line graph of the results shown in the table above. (5)
- 3.2 What was happening between 20 and 30 minutes? (1)
- 3.3 State the energy conversion that takes place between 20 and 30 minutes. (2)
- [8]**

**QUESTION 4**

4.1 Consider the following element X



4.1.1 How many neutrons does this element have? (1)

4.1.2 Draw the energy level diagram for an ion of this element. (3)

4.2 Magnesium is an element that exists naturally in the form of three isotopes.

4.2.1 What are isotopes? (1)

4.2.2 Which sub-atomic particle is responsible for the formation of isotopes. (1)

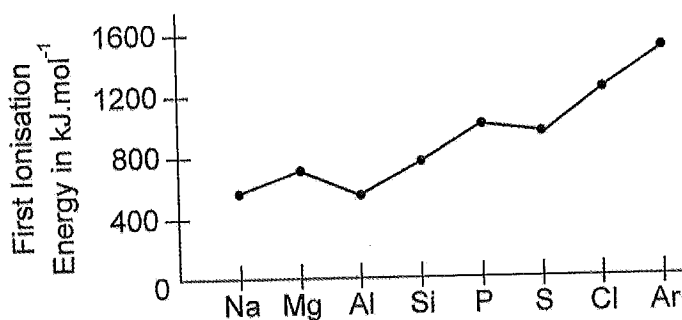
4.2.3 The percentage abundance of each isotope is given below:

Magnesium - 24	78,99%
Magnesium - 25	10,00%
Magnesium - 26	11,01%

Calculate the relative atomic mass of a magnesium atom. (4)

**[10]****QUESTION 5**

The graph of the first ionisation energies of elements in period 3 is given below.

5.1 What is meant by first ionisation energy? (1)

5.2 5.2.1 State the trend in ionisation energies as we move from left to right across a period. (1)

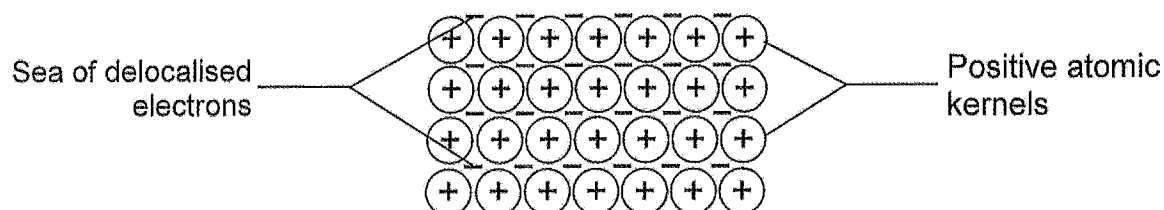
5.2.2 Give an explanation for your answer in question 5.2.1 above. (3)

5.3 Explain the difference in ionisation energies between magnesium (Mg) and Aluminium (Al). (3)

**[8]**

**QUESTION 6**

- 6.1 Covalent bonding occurs when two non-metal atoms overlap and share their valence electrons.
- 6.1.1 What type of substances form as a result of covalent bonding? (1)
- 6.1.2 Use electron dot diagrams to show how hydrogen and oxygen combine to form water. (3)
- 6.2 Lithium metal and chlorine gas can combine to form lithium chloride. Which substance will lose electron/s? (1)
- 6.3 Give the name of the energy involved in each of the following processes.
- 6.3.1 A diatomic substance is separated into two individual atoms. (1)
- 6.3.2 An atom gains electrons. (1)
- 6.4 Ammonium carbonate is an ionic compound.  
Write down the formula for the
- 6.4.1 cation (1)
- 6.4.2 anion (1)
- 6.5 The following is a graphical representation of a metallic bond.



- 6.5.1 By making reference to the diagram above, explain why metals are good conductors of electricity. (2)
- 6.5.2 State one other property of metals. (1)

**[12]****TOTAL MARKS: [50]**

**TABLE 3: THE PERIODIC TABLE OF ELEMENTS**

1 (I)	2 (II)	3	4	5	6	7	8	9	10	11	12	13 (III)	14 (IV)	15 (V)	16 (VI)	17 (VII)	18 (VIII)
1 H 1.0	2 He 4	3 Li 7	4 Be 9									5 B 11	6 C 12	7 N 14	8 O 16	9 F 19	10 Ne 20
11 Na 23	12 Mg 24											13 Al 27	14 Si 28	15 P 31	16 S 32	17 Cl 35.5	18 Ar 40
19 K 39	20 Ca 40	21 Sc 45	22 Ti 48	23 V 51	24 Cr 52	25 Mn 55	26 Fe 56	27 Co 59	28 Ni 59	29 Cu 63.5	30 Zn 65	31 Ga 70	32 Ge 73	33 As 75	34 Se 79	35 Br 80	36 Kr 84
37 Rb 86	38 Sr 88	39 Y 89	40 Zr 91	41 Nb 92	42 Mo 96	43 Tc 96	44 Ru 101	45 Rh 103	46 Pd 106	47 Ag 108	48 Cd 112	49 In 115	50 Sn 119	51 Sb 122	52 Te 128	53 I 127	54 Xe 131
55 Cs 133	56 Ba 137	57 La 139	72 Hf 179	73 Ta 181	74 W 184	75 Re 186	76 Os 190	77 Ir 192	78 Pt 195	79 Au 197	80 Hg 201	81 Tl 204	82 Pb 207	83 Bi 209	84 Po 209	85 At 209	86 Rn 222
87 Fr 226	88 Ra 226	89 Ac															
		90 Th 232	91 Pa 238	92 U 238	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr		
		99 Ce 140	100 Pr 141	101 Nd 144	102 Pm	103 Sm 150	104 Eu 152	105 Gd 157	106 Tb 159	107 Dy 163	108 Ho 165	109 Er 167	110 Tm 169	111 Yb 173	112 Lu 175		

**KEY/SLUUTEL**

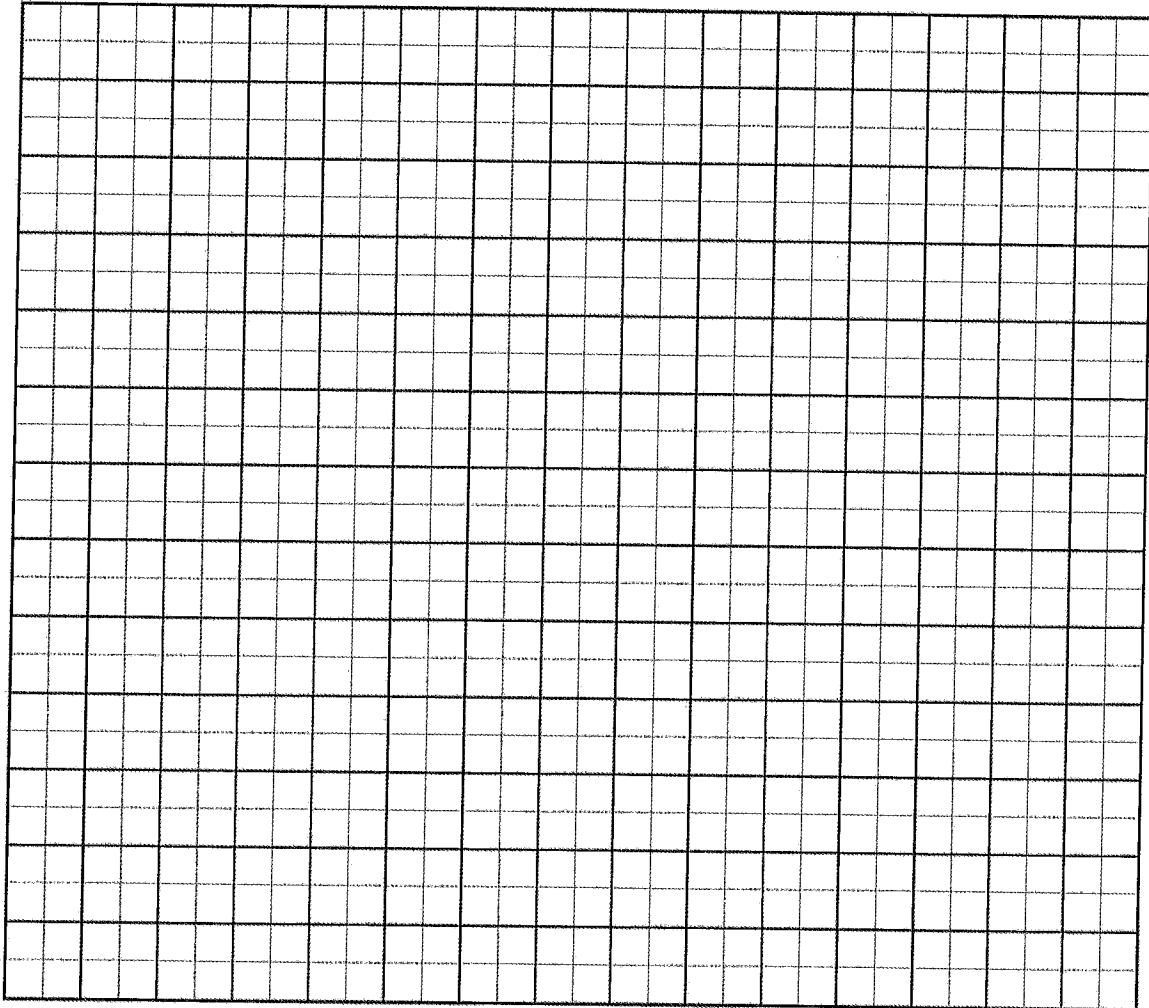
Atomic number <i>Atomgetal</i>	Symbol <i>Simbool</i>
29	Cu
Electronegativity <i>Elektronnegativiteit</i>	63,5

Approximate relative atomic mass  
*Benaderde relatiewe atoommassa*

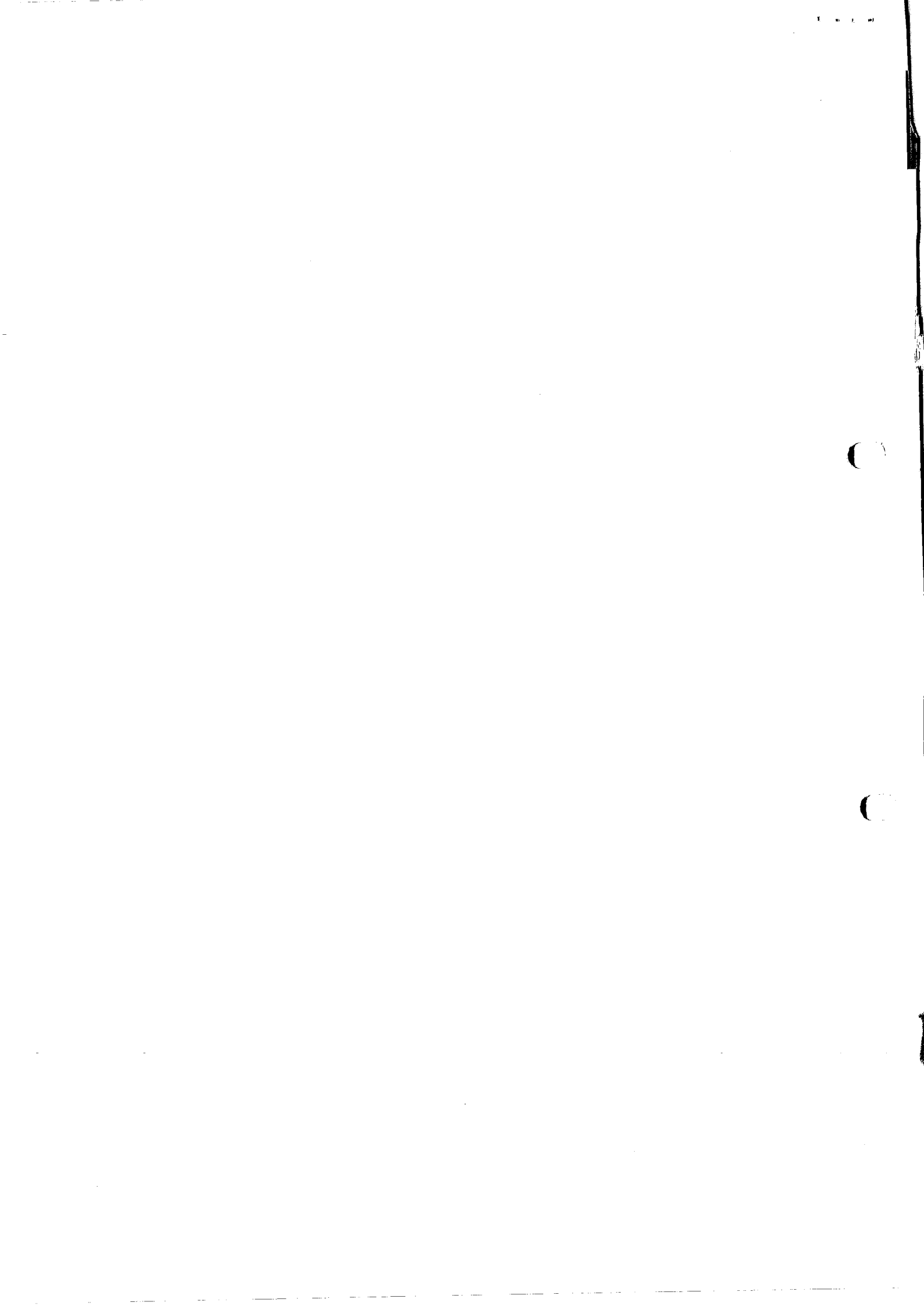
**Answer Sheet : Question 3.1**

**Name:** \_\_\_\_\_

**Grade:** \_\_\_\_\_



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Grades 10 + 11

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This memorandum consists of 4 pages.

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### QUESTION 1

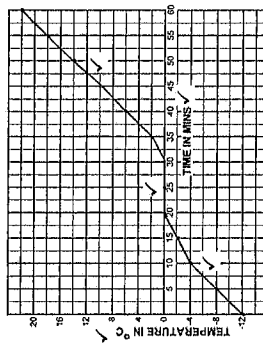
- 1.1 B ✓✓ (2)
  - 1.2 C ✓✓ (2)
  - 1.3 D ✓✓ (2)
- [6]**

### QUESTION 2

- 2.1 Homogeneous mixtures ✓  
Heterogeneous mixtures ✓ (2)
  - 2.2 In homogeneous mixtures the individual substances are all in the same phase. ✓  
In heterogeneous mixtures the substances are in more than one phase. ✓ (2)
  - 2.3.1 Distillation/Fractional distillation ✓ (1)
  - 2.3.2 Separating funnel ✓ (1)
- [6]**

### QUESTION 3

3.1



- ✓ Title and label and on both axes
- ✓ At least 5 points plotted correctly
- ✓ At least 10 points plotted correctly
- ✓ All points plotted correctly
- ✓ Drawing the line of best fit

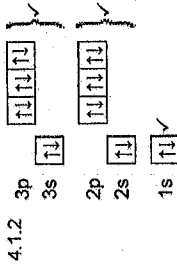
- 3.2 The ice was melting ✓ (5)
  - 3.3 Heat energy is converted to potential energy. ✓✓ (1)
- (2)
- [8]**

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**QUESTION 4**

4.1 4.1.1 17 ✓ (1)



4.2 4.2.1 Isotopes are atoms of the same element, having the same atomic number but different mass numbers. ✓ (1)

4.2.2 Neutrons ✓ (1)

4.2.3 Relative Atomic Mass =  $\left(\frac{78,99}{100}\right)(24)$  ✓ +  $\left(\frac{10,00}{100}\right)(25)$  ✓ +  $\left(\frac{11,01}{100}\right)(26)$  ✓  
= 24,3202 ✓ (4)

[10]

**QUESTION 5**

5.1 The energy required to remove the first electron from a neutral atom in the gaseous phase. ✓ (1)

5.2 5.2.1 Ionisation energy increases. ✓ (1)

5.2.2 As we move from left to right :-  
The atomic number increases ✓  
The nuclear charge increases ✓  
A stronger force of attraction is exerted on the outer electrons ✓ (3)

5.3 Magnesium has 3s orbital completely filled. ✓  
This represents a state of greater stability than aluminium ✓  
that has a single electron in its 3p orbital. ✓  
Hence more energy is needed to remove the electron from magnesium than from aluminium. (3)

[8]

**QUESTION 6**

6.1 6.1.1 Molecules ✓ (1)



(3)

6.2 Lithium ✓ (1)

6.3 6.3.1 Dissociation energy ✓ (1)

6.3.2 Electron affinity ✓ (1)

6.4 6.4.1  $NH_4^+$  ✓ (1)

6.4.2  $CO_3^{2-}$  ✓ (1)

6.5 6.5.1 The sea of delocalised electrons can move freely throughout the metal ✓ and acts as charge carriers ✓ (2)

6.5.2 Any one of :-  
Good conductors of heat ✓  
Malleable ✓  
Ductile ✓  
High density ✓  
High lustre ✓ (1)

[12]

Total Marks: [50]

