GCSE Chemistry

Atomic Structure

Mark Scheme

Time available: 55 minutes
Marks available: 51 marks

1. (a) proton

1

(b) electron

1

(c) 7

1

4

1

in this order only

(d) isotopes

1

(e) neutron

1

(f) $\frac{(10 \times 20) + (11 \times 80)}{100}$

1

= 10.8

1

*an answer of 10.8 scores **2** marks*

(g) $\frac{0.2}{10000}$

1

= 2×10^{-5} (nm)

allow 0.00002 (nm)

1

an answer of 2×10^{-5} (nm) scores 2 marks

[10]

2. (a) **B**

1

(b) **D**

1

(c) **E**

1

(d) **C**

1

(e) 92.5 × 6 **and**
7× 7.5

1

$\frac{607.5}{100}$ **1**

6.075 **1**

6.08 **1**

*allow 6.08 with no working shown for **4** marks*

[8]

3. (a) (i) 7 **1**

(ii) –1 **1**

(iii) neutrons **1**

(b) number of protons **1**

(c) atom **Y** **1**

(d) (i) Ne

allow neon **1**

(ii) has a full outer shell

allow in Group 0

allow a noble gas

or

full outer energy level

allow the shells are full

or

has 8 electrons in its outer shell

ignore in Group 8 **1**

[7]

4. (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]

5. (a) gold

1

(b) atom (s)

1

(c) (i) protons

any order

allow proton

1

neutrons

allow neutron

1

(ii) 3 / three

1

(d) (i) Al

ignore any numbers / charges

1

(ii) any **two** from:

- limited resource
- expensive in terms of energy / mining
- effects on the environment, such as, landfill, atmospheric pollution, quarrying

allow uses a lot of energy to extract.

2

(e) resistant to corrosion

1

does not react (with water or food)

*allow **one** mark for low density with a suitable reason given*

1

[10]

6. (a) because this lithium atom has

3 protons

1

and 4 neutrons

1

mass number is total of neutrons and protons

accept protons and neutrons have a mass of 1

accept number of neutrons = 7 - 3(protons)

ignore mass of electron is negligible

1

(b) grams

accept g

1

^{12}C

*allow carbon-12 **or** C-12*

*ignore hydrogen **or** H*

1

(c) any **three** from:

*max **2** if no numbers given*

numbers if given must be correct

- both have 8 protons

  accept same number of protons
- ^{18}O has 10 neutrons
- ^{16}O has 8 neutrons

  accept different number of neutrons or ^{18}O has two more neutrons
  *for **1** mark*
- both have 8 electrons.

  accept same number of electrons

3

[8]