MARK SCHEME

GCSE

CHEMISTRY

AQA - COMBINED SCIENCE

C1 - TEST 2

ATOMIC STRUCTURE AND THE PERIODIC TABLE

Beginner

1. (a)

name of particle	relative mass	charge
proton	(1)	(+1)
neutron	1	0
electron	(very small)	−1

1 + 1

1

allow words instead of numbers
*allow neutral **or** no charge for the neutron*

(b) (protons) 3

1

(neutrons) 4

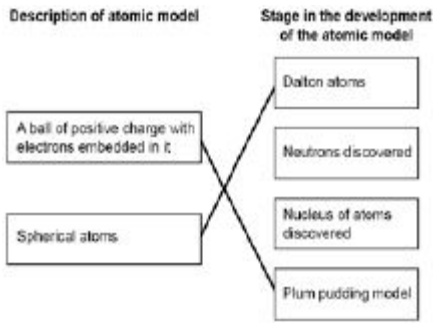
1

(electrons) 3

1

allow words instead of numbers

(c)



1
1

[8]

2. (a) because the mass of an electron is very small

do not accept has no mass

1

(b) 5 / five

1

(c) +5

1

(d) 6

1

(because) mass number = no. protons + no. electrons

allow atomic number = 5

1

(so the number of) neutrons = 11 – 5

allow mass number – number of protons

1

(e) (16 / 31) × 100 = 51.6

1

= 52

*incorrect sig. figs max **1** mark*

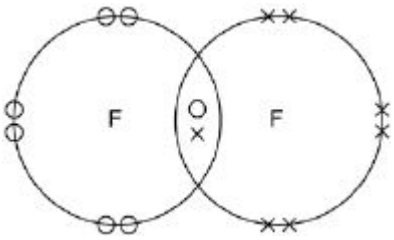
1

[8]

3. (a) group 7

1

(b)



*one shared pair anywhere in overlap between two circles **or** on intersection*

6 other electrons on each atom

*allow dots **or** crosses **or** mixture for all marks*

ignore any inner shell electrons

1
1

(c) bromine

1

potassium chloride

1

either order

allow correct chemical formulae

(d) displacement

1

(e) (an) electron

1

(f) smaller than

1

(g) (chlorine has) fewer levels / shells (of electrons)

allow converse for bromine

allow (chlorine has) fewer electrons

allow Cl has 3 levels / shells <u>and</u> Br has 4 levels / shells

ignore atomic number
***or** mass number*
***or** number of protons*

1

*mark independent of answer to part **(f)***

(h) 3

allow multiples

1

(i) there are <u>weak forces</u>

*do **not** accept weak bonds*

1

between <u>molecules</u>

1

*allow weak intermolecular forces for the first **2** marks*

which require little <u>energy</u> to overcome / break

allow does not need much <u>energy</u> to boil

1

[13]

4. (a) melting points decrease (as the atomic number increases)

allow negative correlation

1

(b) 55
and
29 (°C)

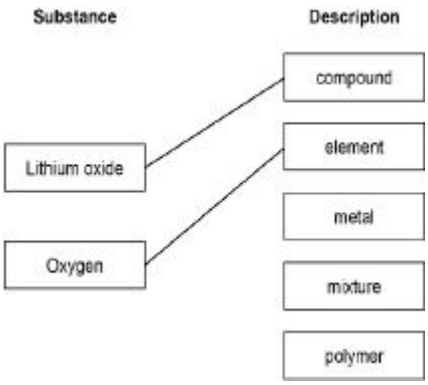
allow values in range 28−32 (°C)

1

(c) 1

1

(d)



1
1

(e) $4\ Li + O_2 \longrightarrow 2\ Li_2O$

allow correct multiples

1

(f) ionic

1

(g) $(M_r) = (2 \times 7) + 16$

1

$= 30$

1

*an answer of 30 scores **2** marks*

[9]

5. (a) Carbon and silicon

1

(b) Atomic number

1

(c) Hydrogen / fluorine / chlorine are not in Group 1 of the periodic table
or
Hydrogen and fluorine / chlorine are not in the same group of the periodic table

1

Lithium / sodium / potassium are in Group 1 of the periodic table

1

(d) plum pudding model has a single ball of positive charge and nuclear model has positive charges in the centre / nucleus

1

plum pudding model has electrons in random positions and nuclear model has electrons in fixed positions

1

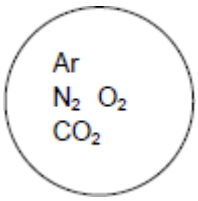
plum pudding model has no nucleus and the nuclear model has a nucleus

1

plum pudding model has no neutrons and the nuclear model has neutrons in the nucleus

1

(e)



1

(f) Covalent bond

1

[10]

6.

(a) Flask

1

(b) Fractional distillation

1

(c) **A** – boiling

in this order

1

B – condensing

1

(d) Octane

1

(e) Formulation

1

(f) the fuel is a pure compound

1

and crude oil is a mixture

or

the fuel is made up of four hydrocarbons

allow crude oil contains a large number of compounds and the fuel contains four

and crude oil could have many more

1

(g) (35 + 37 + 37 / 3) = 36.33

1

36

1

*allow (35 + 48 + 37 + 37 / 4 =) 39(.25) for **1** mark*

[10]

7.

(a) alkali metals

1

(b) any **one** from:
- small piece of metal
- large volume of water
- use a (safety) screen
- keep a safe distance (between teacher / students and apparatus)

1

(c) reactivity increases down the group

1

any **two** from:
- speed increases (down the group)
- sodium / potassium melts but lithium does not
- flame is seen with potassium, but no flame with lithium / sodium

2

(d) rubidium is too reactive

allow reaction would be violent

1

(e) $2Na + 2H_2O \longrightarrow 2NaOH + H_2$

allow correct multiples

1

(f) sodium hydroxide

1

(g) an answer in the range 0.373−0.495 (nanometres)

1

(h) 3.04×10^{-10} m

1

(i) batteries increased from 10 to 28

or

batteries increased by 18

allow batteries increased approximately ×3

1

producing ceramics and / or glass increased from 10 to 22

or

producing ceramics and / or glass increased by 12

allow ceramics and / or glass increased by approximately ×2

1

lubricants decreased from 8 to 6

or

lubricants decreased by 2

allow lubricants decreased by a quarter

1

*if no other marks awarded allow **1** mark for batteries and glass / ceramics increased, lubricants decreased, with no or incorrect data*

[13]