

Atomic structure – 2021/20 GCSE Gateway Chemistry A**1. Nov/2020/Paper_J248/01/No.12**

A potassium isotope can be shown as:



What are the numbers of protons, neutrons and electrons in this potassium isotope?

- A 19 protons, 19 neutrons, 20 electrons
- B 19 protons, 20 neutrons, 19 electrons
- C 20 protons, 19 neutrons, 19 electrons
- D 20 protons, 20 neutrons, 19 electrons

Your answer

[1]

2. Nov/2021/Paper_J248/03/No.15

A carbon dioxide molecule is shown in the ball and stick model.



Which estimate of the distance between the oxygen atoms in a carbon dioxide molecule is correct?

- A $2.0 \times 10^{-7} \text{ m}$
- B $2.0 \times 10^{-10} \text{ m}$
- C $2.0 \times 10^{-15} \text{ m}$
- D $2.0 \times 10^{-20} \text{ m}$

Your answer

[1]

3. Nov/2021/Paper_J248/03/No.19

This question is about elements in Group 7 of the Periodic Table.

The table shows some properties of Group 7 elements.

Element	Molecular formula	Melting point (°C)	Boiling point (°C)	Order of reactivity
Fluorine	F ₂	-220	<div>most reactive</div> <div>↑</div> <div>↓</div> <div>least reactive</div>
Chlorine	Cl ₂	-101	-34	
Bromine	Br ₂	-7	59	
Iodine	I ₂	114	184	
Astatine	At ₂	337	

(a) Complete the table. Use ideas about trends down Group 7. [2]

(b) Chlorine reacts with sodium bromide, NaBr, in a displacement reaction.

Write the **balanced symbol** equation for this reaction.

..... [2]

(c) Explain, in terms of the arrangement of electrons, the **decrease** in reactivity from fluorine to astatine.

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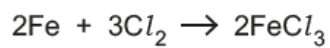
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..... [3]

(d) Iron reacts with chlorine to form iron chloride.

Look at the equation for the reaction.



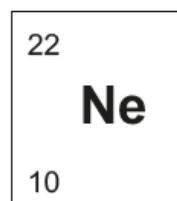
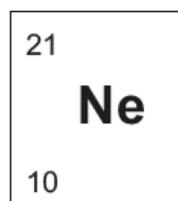
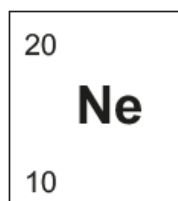
Calculate the mass of iron chloride that can be made from 2.80 g of iron.

Give your answer to **3** significant figures.

(The relative atomic mass, A_r , of Cl is 35.5 and of Fe is 55.8).

Mass of iron chloride = g **[4]**

- (ii) Three isotopes of neon are shown.



How many neutrons does an atom of neon-21 contain?

..... [1]

- (iii) Calculate how many **moles** of neon there are in 101 g of neon.

(The relative atomic mass, A_r , of Ne is 20.2.)

Moles of neon = mol [2]

- (c) Neon is in Group 0 of the Periodic Table. Lithium is in Group 1 of the Periodic Table.

Explain, in terms of electronic structure, why elements in Group 1 are **more** reactive than elements in Group 0.

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 [2]