



Edexcel GCSE Chemistry



Your notes

Group 0

Contents

* Group 0 (Noble Gases)



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- The elements in group 0 of the periodic table are called the noble gases
- They are all non-metal, **monatomic** (exist as single atoms), **colourless**, **non-flammable** gases at room temperature
- The group 0 elements all have **full outer shells** of electrons; this electronic configuration is **extremely stable**
- Elements participate in reactions to complete their outer shells by losing, gaining, or sharing **electrons**
 - The Group 0 elements do not need to do this, because of their full outer shells which makes them unreactive and **inert**
- Other than helium which has 2 electrons in its outer shell, the noble gases have eight valence electrons (which is why you may see this group labelled "group 8")
- Electronic configurations of the Noble gases:
 - He = 2
 - Ne = 2.8
 - Ar = 2.8.8
 - Kr = 2.8.18.8
 - Xe = 2.8.18.18.8



Your notes

Using Noble Gases

Uses of the Noble gases

- Although chemically inert, the noble gases do have several applications and uses
- Helium is used for filling balloons and weather balloons as it is **less dense** than air and does not burn.
- Neon, argon and xenon are used in **advertising** signs
- Argon is used to provide an **inert atmosphere** for **welding** and to fill **electric light** bulbs
- Apart from older style incandescent light bulbs, argon is used in low energy **light** bulbs. Like the other noble gases, it has the unusual property of glowing brightly when a high potential difference is applied to the gas under low pressure



Your notes



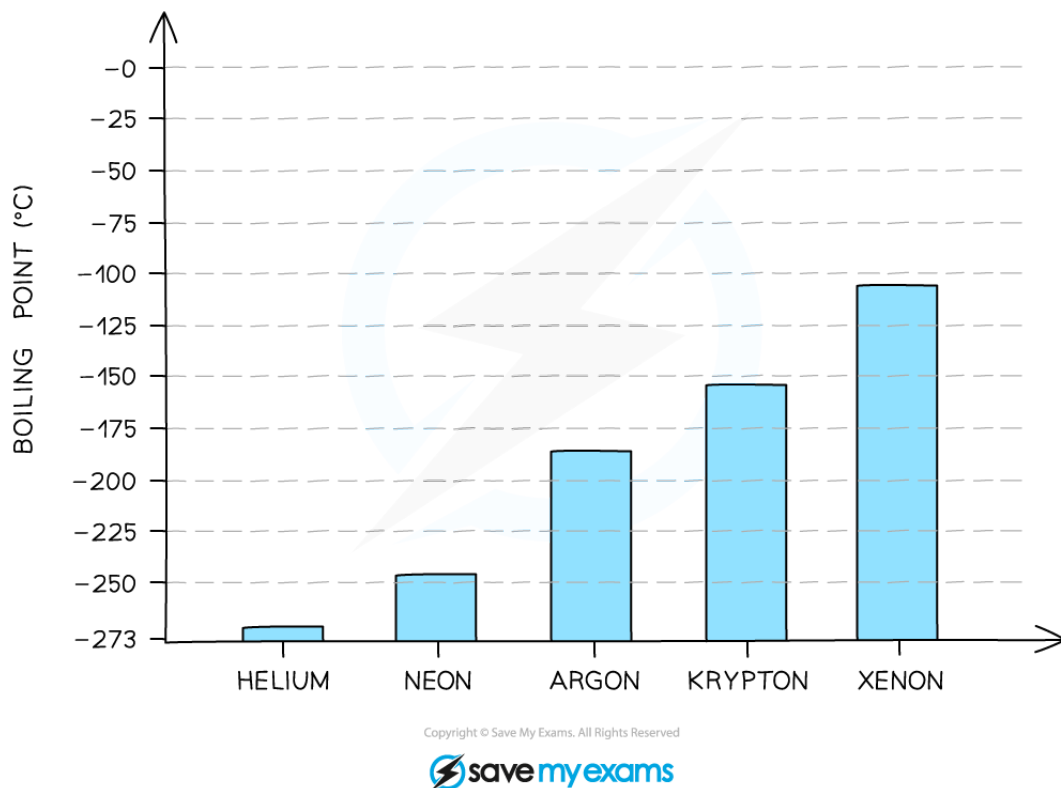
Argon is used to fill light bulbs

Trends in Group 0

- As with other groups, there are trends in the physical properties of the noble gases
- The noble gases have very **low melting** and **boiling** points
- They show an **increase** in boiling point as we move **down** the group due to an increase in the **relative atomic mass** (the atoms get larger as you move down the group)
- This leads to an increase in intermolecular forces between atoms, increasing the amount of energy needed to overcome these forces to change state
- Elements further down the group have **higher** boiling points but these still lie **below 0 °C**.
- Helium has the lowest boiling point of all known elements at -269 °C , while radon boils at around -60 °C .



Your notes

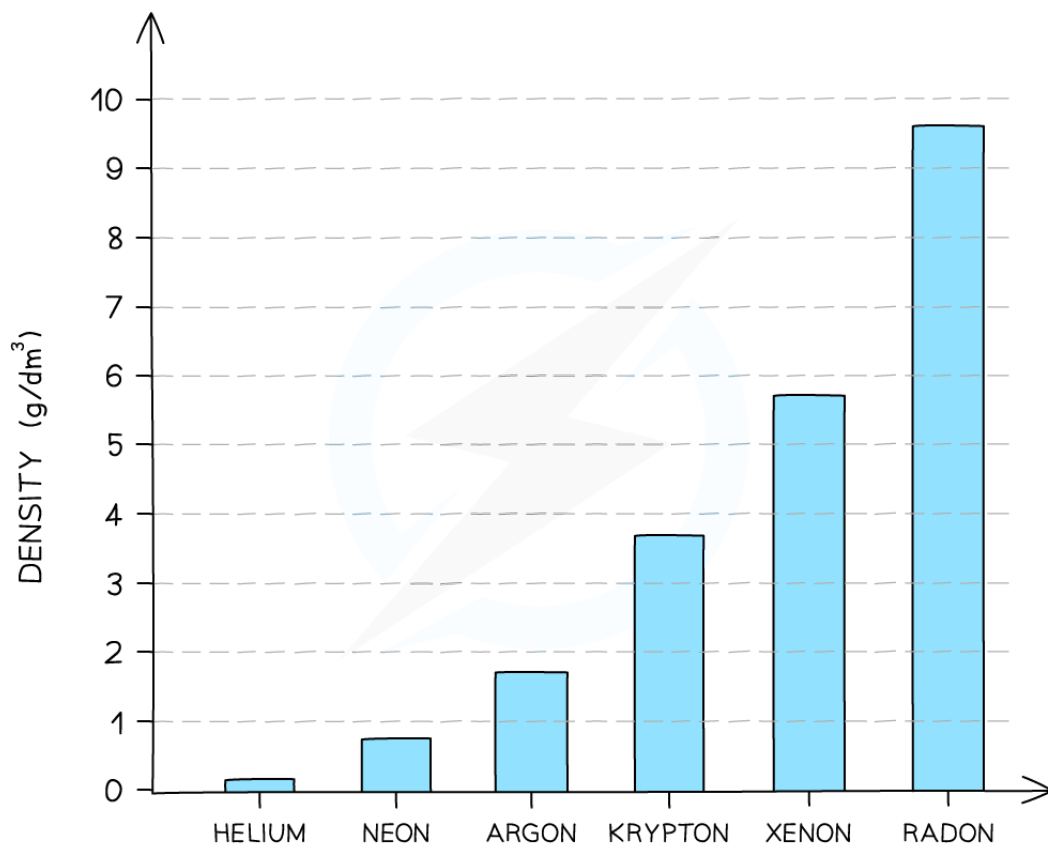


This graph shows the trend in boiling point of the noble gases

- Since the group 0 elements are all gases at room temperature, individual atoms are **widely spaced apart**, giving them low densities
 - Their density **increases** as you move down the group
- Elements further down the group would be expected to have **higher densities**
- Helium is the **lightest noble** gas and radon is the **heaviest**



Your notes



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This graph shows the trend in the densities of the noble gases



Examiner Tips and Tricks

Exam questions often give you the boiling point of a noble gas and ask you to estimate the value of another one, so it is important to remember the **general** trends in the group 0 elements. You do not need to learn these values exactly!