

Alkali metals, halogens and noble gases

Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Test answers (mark scheme)

Each model answer is followed by the marking points. Accept any correct equivalent wording and award marks for correct reasoning even when a number is slightly off.

Level: Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** GCSE C1, IGCSE 9

Question 1 Potassium in water (3 marks)

Any three: it floats; it melts into a ball; it fizzes or gives off gas; it moves around the surface; a lilac flame appears; it gets smaller and disappears.

Marking: 1 mark each, up to 3.

Question 2 Equation for potassium (3 marks)

$2\text{K(s)} + 2\text{H}_2\text{O(l)} \rightarrow 2\text{KOH(aq)} + \text{H}_2\text{(g)}$. The solution is alkaline with a pH greater than 7 (about 13 to 14).

Marking: 1 mark correct formulae; 1 mark balanced with state symbols; 1 mark alkaline.

Question 3 Halogens in appearance (2 marks)

Chlorine is a pale green gas. Iodine is a grey solid (it gives a purple vapour).

Marking: 1 mark for each halogen.

Question 4 Bromine and sodium iodide (3 marks)

(a) The solution turns from orange to brown.

(b) $\text{Br}_2 + 2\text{NaI} \rightarrow 2\text{NaBr} + \text{I}_2$

(c) Bromine is more reactive than iodine, so it displaces iodine from its salt.

Marking: 1 mark each.

Question 5 Noble gases (2 marks)

Argon has a full outer shell of electrons, so it does not lose, gain or share electrons. One use: filling filament lamps or shielding welds.

Marking: 1 mark for the full outer shell; 1 mark for a correct use.

Question 6 Alkali metal trend (3 marks)

Both have one outer electron. In caesium the electron is in a shell much further from the nucleus. It is also shielded by more inner shells, so it is held weakly and lost more easily.

Marking: 1 mark further from nucleus; 1 mark more shielding; 1 mark lost more easily.

Question 7 Mass of sodium bromide (2 marks)

$n(\text{NaBr}) = 2 \times 0.0500 = 0.100 \text{ mol}$. Mass = $0.100 \times 103 = 10.3 \text{ g}$.

10.3 g

Marking: 1 mark for the mole ratio; 1 mark for the mass.

Question 8 Halogen atoms (2 marks)

Chlorine has fewer shells, so the electron it gains enters a shell closer to the nucleus. There is less shielding, so the attraction is stronger.

Marking: 1 mark closer to the nucleus; 1 mark less shielding or stronger attraction.