Year 9 Metals and the Reactivity Series Worksheet - Mark Scheme

Year 9 · KS3 Chemistry · Reactivity, displacement, extraction and corrosion

Section A: The reactivity series and reactions of metals [14 marks]

1	potassium, sodium, calcium, magnesium, aluminium, zinc, iron, copper Guidance: 3 marks for fully correct; 2 marks if one metal out of place; 1 mark if potassium first and copper last.	**3**
2	Copper; sodium; potassium; calcium; magnesium. Guidance: 1 mark each.	**5**
3(a)	hydrogen	**1**
3(b)	calcium hydroxide	**1**
3(c)	magnesium chloride	**1**
3(d)	hydrogen	**1**
3(e)	$2Na + 2H_2O \longrightarrow 2NaOH + H_2$ Guidance: 1 mark for correct numbers in front of Na and H_2O; 1 mark for NaOH.	**2**

Section B: Displacement reactions [12 marks]

4	Yes; No; Yes; Yes; No. Guidance: 1 mark each.	**5**
5	zinc sulfate (1) + copper (1)	**2**
6	A reddish-brown (pink) solid coats the nail (1). The blue solution fades to a paler green colour (1).	**2**
7	P, Q, R Guidance: 3 marks for correct order with a reason; 1 mark for the P and Q comparison, 1 mark for the Q and R comparison, 1 mark for R and P.	**3**

Section C: Extraction, uses and corrosion [14 marks]

8	They are very unreactive so do not form compounds.	**1**
9	iron oxide + carbon ⟶ iron + carbon dioxide (1). Aluminium is more reactive than carbon (1) so carbon cannot displace it; electrolysis is used instead (1).	**3**
10	Any three: good conductor of electricity; good conductor of heat; unreactive so does not corrode; malleable / ductile so can be bent and drawn into wires. Guidance: 1 mark each.	**3**
11	Aluminium reacts with oxygen in the air to form a thin layer of aluminium oxide (1). This layer is unreactive and protects the metal underneath (1).	**2**
12	Oxygen (air) and water (2). Prevention: painting; oiling or greasing; galvanising (coating with zinc); plating; sacrificial protection (any three, 3). Guidance: 1 mark for each correct condition; 1 mark for each prevention method up to 3.	**5**

Section D: Data and practical skills [9 marks]

13(a)	magnesium, zinc, iron, copper	**2**
13(b)	Hydrogen (1); a lit splint gives a squeaky pop (1).	**2**
13(c)	Any three: volume of acid; concentration of acid; size or mass of metal; temperature; time. Guidance: 1 mark each.	**3**
13(d)	Wear eye protection / use small pieces / dilute acid / do not inhale gas.	**1**
13(e)	Faster than magnesium because calcium is more reactive.	**1**

Total: 49 marks. Accept any scientifically correct alternative wording.