REDOX, GROUP 2 AND GROUP 7 TEST MS

1. (a) ……Ca(s) + …..2 ✓ HC*l*(aq) …….Ca$C*l*_2$(aq) + .H_2(g). ✓ 2

(g) not required for H_2

(b) In Ca, oxidation state = 0 ✓ and 2
In Ca$C*l*_2$, oxidation state = +2 ✓
Oxidation number increases from Ca to Ca$C*l*_2$

[4]

2. (i) hydrogen / H_2 ✓ 1

(ii) $Sr + 2H_2O \rightarrow Sr(OH)_2 + H_2$ ✓ 1

(iii) different numbers of moles/atoms/ different A_r values✓
so different number of moles of H_2 /more moles of Ca✓
(*i.e. an attempt to quantify difference*) 2

(iv) 8 – 14 ✓ 1

[5]

3. barium atoms are larger ✓

barium atoms have more shielding ✓

this outweighs the increase in nuclear charge ✓

barium electrons are lost more easily/less energy required/ionisation energy decreases ✓

[4]

4. O goes from –2 to 0 ✓

Oxidation numbers may be seen with equation

N goes from +5 to +4 ✓

N is reduced **AND** O is oxidised ✓

Third mark is dependent upon seeing a reduction in oxidation number of N and an increase in oxidation number of O

***ALLOW** ECF for third mark for N is oxidised **and** O is reduced if incorrect oxidation numbers support this*

***IGNORE** references to strontium*
***IGNORE** references to electron loss **OR** gain*

***DO NOT ALLOW** 'One increases and one decreases'*

[3]

5. $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$
equation ✓
state symbols ✓

*state symbols are **dependent** on correct formulae of $CaCO_3$, CaO and CO_2*

***DO NOT ALLOW** the 'equation mark' if O_2 is seen on both sides (but note that the 'state symbol mark' may still be accessible)*

[2]

6. (i) $Ca(OH)_2$ ✓

IGNORE *charges, even if wrong*

1

(ii) $Ca(NO_3)_2$ ✓

IGNORE *charges, even if wrong*

1

[2]

7. (i) goes brown ✓

ALLOW *yellow* ***OR*** *orange* ***OR*** *any shade of yellow, orange and brown, e.g. reddish-brown*

IGNORE *precipitate*

1

(ii) iodine and (potassium) chloride ✓

$Cl_2 + 2I^- \rightarrow I_2 + 2Cl^-$ ✓

DO NOT ALLOW *formulae (i.e. names essential)*

ALLOW *any correct multiple including fractions*

IGNORE *state symbols*

2

(iii) chlorine / Cl_2 is more reactive (than iodine)

OR

chlorine / Cl_2 is a more powerful oxidising agent ✓

ALLOW *chlorine is better at electron capture* ***OR*** *chlorine attracts electrons more*

ALLOW *iodine is less reactive (than chlorine)*

ALLOW *iodide (ion) / I^- is a stronger reducing agent*

DO NOT ALLOW *Cl is more reactive*

DO NOT ALLOW *explanation in terms of displacement*

DO NOT ALLOW *chlorine is more electronegative*

1

(iv) goes purple / violet / lilac / pink ✓

ALLOW *pink* ***OR*** *any combination of purple, violet, lilac and pink*

1

[5]

8. (i) $203.3\ g\ mol^{-1}$ ✓ 1
Accept 203

(ii) white precipitate / goes white ✓ 1

(iii) $Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$
equation ✓
state symbols ✓ 2
AgCl dissolves in $NH_3(aq)$ ✓

(iv) AgBr dissolves in **conc** $NH_3(aq)$/
partially soluble in $NH_3(aq)$ ✓

AgI insoluble in $NH_3(aq)$ ✓ 3

[7]

9. Cl_2: 0 ✓
HOCl +1 ✓
HCl −1 ✓

[4]

10. (a) bleach / disinfectant /sterilising /killing germs✓ 1

(b) $NaClO_3$✓ 1

[3]

11. (a) add $AgNO_3$ /add Ag^+ ✓ 3
ignore ammonia
white (precipitate)/goes white/precipitate that dissolves in dilute $NH_3(aq)$ ✓

$Ag^+ + Cl^- \rightarrow AgCl$ ✓
(ignore state symbols)

(b) add NaOH ✓ 2

$Cl_2 + 2NaOH \rightarrow NaCl + NaClO + H_2O$ ✓

or partial or completely ionic equation:
$Cl_2 + 2NaOH \rightarrow 2Na^+ + ClO^- + Cl^- + H_2O$/
$Cl_2 + 2OH^- \rightarrow ClO^- + Cl^- + H_2O$ ✓

[5]