EXAM PAPERS PRACTICE

Boost your performance and confidence with these topic-based exam questions

Practice questions created by actual examiners and assessment experts

Detailed mark scheme

Suitable for all boards

Designed to test your ability and thoroughly prepare you

Time allowed
47 Minutes

Score /39

Percentage %

CHEMISTRY

OCR AS & A LEVEL

Mark Scheme

Module 2: Foundatons in chemistry

1. (i) 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

(ii) Calculates correctly:

Mol of $Sr(NO_3)_2 = \frac{5.29}{211.6} = 0.0250$ ✓

ALLOW *0.025*

Calculates correctly:
Mol of gas = 5/2 × 0.0250 = 0.0625 ✓

ALLOW *ECF for first answer × 2.5 as calculator value or correct rounding to 2 significant figures or more but ignore trailing zeroes*

Calculates correctly:
Volume of gas = 24.0 × 0.0625 = 1.50 dm^3 ✓

ALLOW *ECF for second answer × 24(.0) as calculator value or correct rounding to 2 significant figures or more but ignore trailing zeroes*

DO NOT ALLOW *ECF of first answer × 24(.0) (which gives 0.6(0) dm^3) as this has not measured the volume of any gas, simply 0.0250 mol of solid $Sr(NO_3)_2$ converted into a gas*

i.e. This answer would give ***one*** *mark*

ALLOW *1.5 dm^3*

ALLOW *ECF producing correct volume of NO_2 only*

i.e. 1.2(0) dm^3 would give ***two*** *marks*

OR

ALLOW *ECF producing correct volume of O_2 only*

i.e. 0.3(0) dm^3 would give ***two*** *marks*

3

[6]

2. (i) Mg ✓
oxidation number changes from 0 to (+)2
OR oxidation number increases by 2 ✓
ALLOW *correct oxidation numbers shown in equation*
2nd mark is dependent on identification of Mg
IGNORE *electrons*

2

(ii) Mg/solid dissolves **OR** Mg/solid disappears
OR (Mg/solid) forms a solution ✓

bubbles **OR** fizzes **OR** effervesces **OR** gas produced ✓
IGNORE *metal reacts*
IGNORE *temperature change*
IGNORE *steam produced*
DO NOT ALLOW *carbon dioxide gas produced*
DO NOT ALLOW *hydrogen produced without* ***gas***

2

[4]

3. (i) because Ca has changed from 0 to +2 **(1)**
and H has changed from +1 to 0 **(1)** 2

(ii) Calcium reacts with water producing
hydrogen/H_2/calcium/hydroxide/$Ca(OH)_2$ **(1)** (i.e. one product)
$Ca(s) + H_2O(l) \rightarrow Ca(OH)_2(aq) + H_2(g)$ **(1)** (i.e. full equation)
Equation would subsume both two marks 2

[4]

4. (a) (i) $12 \times 50/1000 = 0.600$ mol ✓ 1

(ii) 4 mol HCl → 1 mol Cl_2 / moles $Cl_2 = 0.15$ mol ✓
vol of $Cl_2 = 0.15 \times 24 = 3.60$ dm^3 ✓ 2
2nd mark is consequential on molar ratio given

(b) Evidence that the oxidation number of Mn has reduced
and one of the oxidation numbers correct (ie MnO_2: ox no of Mn = +4 or $MnCl_2$: ox no of Mn = +2 ✓
The **other** oxidation number of Mn is correct,
ie in MnO_2: ox no of Mn = +4
or in $MnCl_2$: ox no of Mn = +2 ✓ 2

[5]

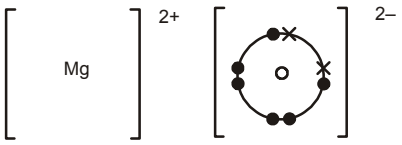
5. (i) loss (of electrons) ✓ 1

(ii) Ba ✓
$0 \rightarrow (+)2$ ✓ (accept 2+) 2

[3]

6. (i) Oxidation state goes from 0 in O_2 ✓
$\rightarrow -2$ in MgO ✓ 2

(ii)



or with Mg full shell.
correct dot and cross✓; correct charges✓ 2

[4]

7. (a) (i) Amount of substance that has the same number of particles as there are atoms in 12 g of ^{12}C/
6×10^{23}/ Avogadro's Number✓ 1

(ii) moles = $\frac{0.275 \times 120}{1000}$ = 0.0330 mol✓

moles Cl_2 = $\frac{0.0330}{2}$ = 0.0165 mol✓ 1

(iii) volume $Cl_2 = 0.0165 \times 24000 = 396\ cm^3$ ✓/ $0.396\ dm^3$
792 cm^3 worth 1 mark (no molar ratio)
1584 cm^3 worth 1 mark (x 2)
units needed. 2

(iv) bleach / disinfectant /sterilising /killing germs✓ 1

(b) $NaClO_3$✓ 1

[6]

8. (a) ……Ca(s) + …..2 ✓ HCl(aq) …….$CaCl_2$(aq) + .H_2(g). ✓ 2

(g) not required for H_2

(b) In Ca, oxidation state = 0 ✓ and
In $CaCl_2$, oxidation state = +2 ✓
Oxidation number increases from Ca to $CaCl_2$ 2

[4]

9. (a) $RaCl_2$ ✓ 1

(b) Reduction is gain of electrons/decrease in oxidation number
✓
Ra^{2+} gains 2 electrons → Ra/
Oxidation state goes from +2 in $RaCl_2$ → 0 in Ra ✓ 2

[3]