Electrochemistry – 2020 O Level

1. Nov/2021/Paper_11/No.11

Which statement describes ionic bonds?

A a lattice of ions in a 'sea of electrons'

B electrostatic attraction between oppositely charged ions

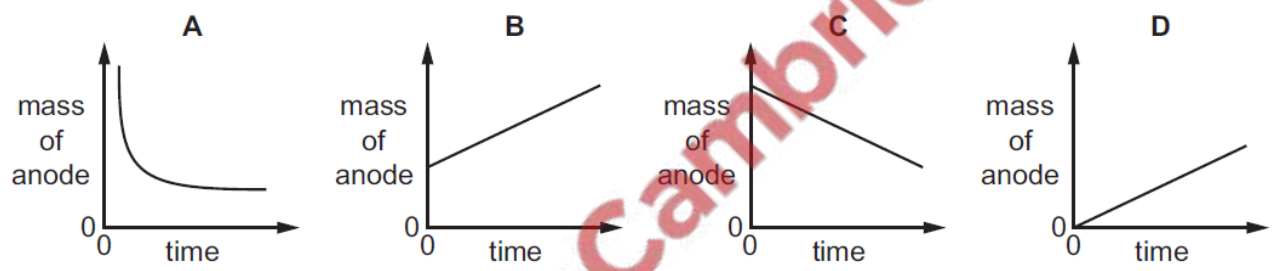
C the sharing of electrons between atoms to gain a noble gas configuration

D the transfer of electrons from atoms of a non-metal to the atoms of a metal

2. Nov/2021/Paper_11/No.18

Aqueous copper(II) sulfate is electrolysed using copper electrodes. The current is constant and the anode is weighed at regular time intervals.

Which graph is obtained when the mass of the anode is plotted against time?



3. Nov/2021/Paper_11/No.19

Concentrated aqueous sodium chloride is electrolysed using inert electrodes.

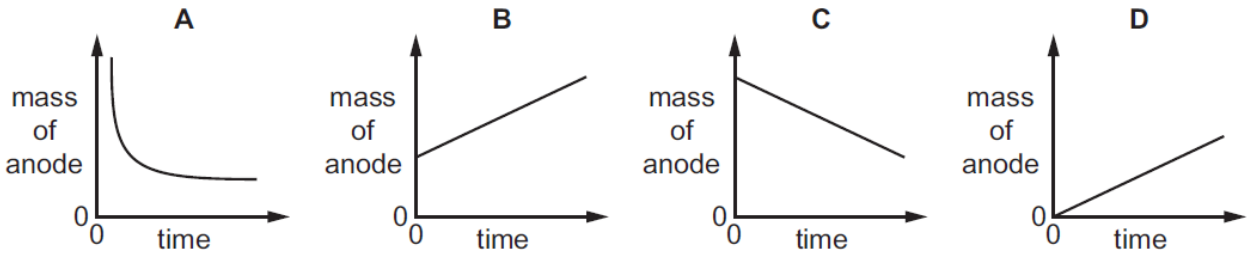
Which row shows what happens in this electrolysis and why it happens?

	change occurring	explanation
A	oxygen is discharged at the anode	$OH^-(aq)$ loses electrons more easily than does $Cl^-(aq)$
B	during electrolysis the pH of the electrolyte increases	the electrolysis in aqueous solution involves the discharge of $H^+(aq)$ ions
C	solid sodium is discharged at the cathode	$Na^+(aq)$ is present in aqueous solution
D	the products stay the same if the aqueous sodium chloride is replaced by molten sodium chloride	Na^+ and Cl^- are present in both molten and aqueous sodium chloride

4. Nov/2021/Paper_12/No.18

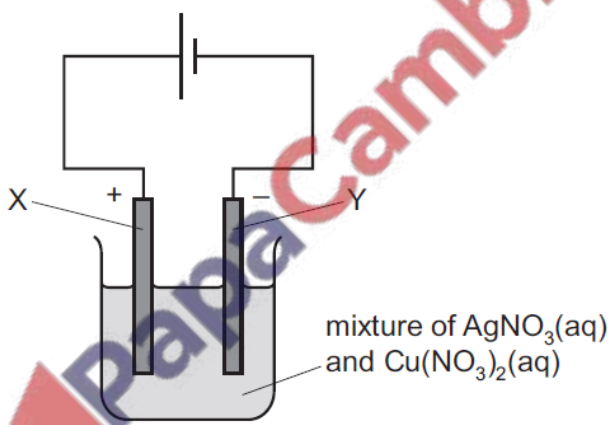
Aqueous copper(II) sulfate is electrolysed using copper electrodes. The current is constant and the anode is weighed at regular time intervals.

Which graph is obtained when the mass of the anode is plotted against time?



5. Nov/2021/Paper_12/No.19

The diagram shows the electrolysis of a mixture of aqueous copper(II) nitrate, $Cu(NO_3)_2(aq)$, and aqueous silver nitrate, $AgNO_3(aq)$. Electrodes X and Y are inert.



Copper is above silver in the reactivity series.

It can be deduced that .....1..... is initially deposited at electrode .....2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	copper	X
B	copper	Y
C	silver	X
D	silver	Y

6. Nov/2021/Paper_22/No.2c

(c) The electrolysis of molten sodium chloride is carried out using graphite electrodes.

(i) State the meaning of the term *electrolysis*.

.....

..... [1]

(ii) State the direction of movement of both the positive and negative ions when molten sodium chloride is electrolysed.

positive ions .....

negative ions .....

[1]

(iii) State one observation that can be made at the positive electrode when molten sodium chloride is electrolysed.

..... [1]

(iv) Give the formulae of the two negative ions present in aqueous sodium chloride.

..... [1]

7. Jun/2020/Paper_11/No.15

An aqueous solution contains 0.01 mol of $Zn^{2+}(aq)$ and 0.01 mol of $Cu^{2+}(aq)$.

Aqueous sodium hydroxide is added until in excess.

After shaking, the mixture is filtered.

What remains on the filter paper?

A 0.01 mol of a white hydroxide and 0.01 mol of a blue hydroxide

B 0.01 mol of a white hydroxide

C 0.01 mol of a blue hydroxide

D no solid residue

8. Jun/2020/Paper_11/No.16

Which arrangement is used to electroplate copper onto a steel key?

	electrolyte	anode (positive electrode)	cathode (negative electrode)
A	aqueous copper(II) sulfate	piece of pure copper	steel key
B	aqueous copper(II) sulfate	steel key	piece of pure copper
C	dilute sulfuric acid	piece of pure copper	steel key
D	dilute sulfuric acid	steel key	piece of pure copper

9. Jun/2020/Paper_11/No.18

Pieces of zinc are added to aqueous copper(II) sulfate.

$$Cu^{2+}(aq) + Zn(s) \rightarrow Zn^{2+}(aq) + Cu(s)$$

Which statement is correct?

A $Cu^{2+}(aq)$ is oxidised to Cu(s) by gaining electrons.

B $Cu^{2+}(aq)$ is reduced to Cu(s) by losing electrons.

C Zn(s) is oxidised to $Zn^{2+}(aq)$ by losing electrons.

D Zn(s) is reduced to $Zn^{2+}(aq)$ by gaining electrons.

10. Jun/2020/Paper_11/No.30

In the electrolysis of molten aluminium oxide, which statement is correct?

A The molar ratio of aluminium to oxygen gas formed is 1 : 2.

B The molar ratio of aluminium to oxygen gas formed is 3 : 4.

C Oxygen gas is formed at the anode.

D Reduction occurs at the anode.

11. Jun/2020/Paper_12/No.16

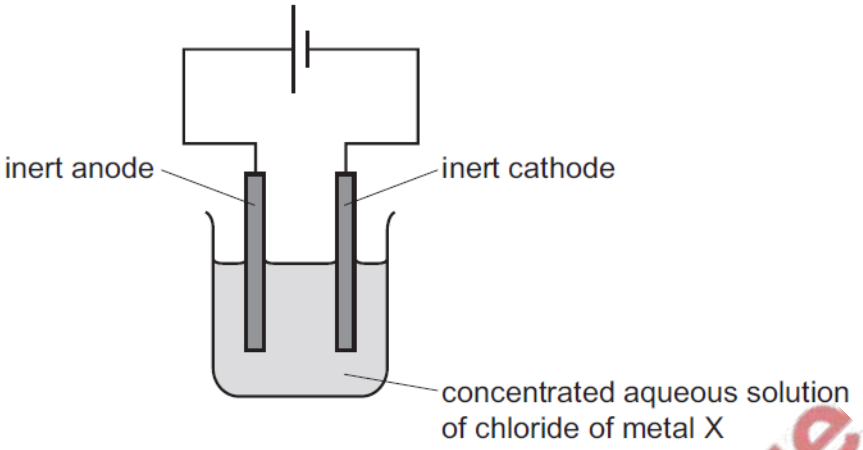
Which arrangement is used to electroplate copper onto a steel key?

	electrolyte	anode (positive electrode)	cathode (negative electrode)
A	aqueous copper(II) sulfate	piece of pure copper	steel key
B	aqueous copper(II) sulfate	steel key	piece of pure copper
C	dilute sulfuric acid	piece of pure copper	steel key
D	dilute sulfuric acid	steel key	piece of pure copper

12. Jun/2020/Paper_12/No.17

The chloride of metal X is dissolved in water.

A concentrated solution of this chloride is electrolysed using inert electrodes.



X is above sodium in the reactivity series.

In addition to chlorine, which gas is liberated and at which electrode?

	gas	liberated at electrode
A	hydrogen	anode
B	hydrogen	cathode
C	oxygen	anode
D	oxygen	cathode

13. Jun/2020/Paper_12/No.19

Many reactions can be classified as redox reactions.

Which equations show redox reactions?

1 $Mg + 2HCl \rightarrow MgCl_2 + H_2$

2 $2FeCl_2 + Cl_2 \rightarrow 2FeCl_3$

3 $2Na + Br_2 \rightarrow 2NaBr$

A 1, 2 and 3 **B** 1 and 2 only **C** 2 and 3 only **D** 3 only