



# Chem!stry

Name: ..... ( )

Class: .....

Date: ..... / ..... / .....

## Electrochemistry – Ionic Half-Equations

Write ionic half-equations to describe the chemistry taking place at the anode and the cathode when each of the following substances is electrolysed.

Remember, in general:

- Negative ions (anions) are attracted towards the positive electrode (anode) where they are oxidised.
- Positive ions (cations) are attracted towards the negative electrode (cathode) where they are reduced.

Remember, for aqueous solutions:

- In addition to ions of the solute, aqueous solutions also contain  $H^+_{(aq)}$  and  $OH^-_{(aq)}$  ions due to ionisation of the water molecules.
- If the solute contains a cation of a metal that is *above* hydrogen in the electrochemical series, *hydrogen* is preferentially discharged at the cathode.
- If the solute contains a cation of a metal that is *below* hydrogen in the electrochemical series, the *metal* is preferentially discharged at the cathode.
- At the anode,  $OH^-_{(aq)}$  is preferentially oxidised unless the solution is a concentrated  $Cl^-_{(aq)}$ ,  $Br^-_{(aq)}$ , or  $I^-_{(aq)}$ . Other ions, such as  $CO_3^{2-}$ ,  $NO_3^-_{(aq)}$  and  $SO_4^{2-}$  are not normally oxidised.

1) Molten sodium chloride –  $NaCl_{(l)}$

- Anode: .....
- Cathode: .....

2) Molten lead(II) iodide –  $PbI_{2(l)}$

- Anode: .....
- Cathode: .....

3) Molten silver bromide –  $AgBr_{(l)}$

- Anode: .....
- Cathode: .....

- 4) Molten aluminium oxide –  $Al_2O_{3(l)}$
- Anode: .....
  - Cathode: .....
- 5) Water –  $H_2O_{(l)}$
- Anode: .....
  - Cathode: .....
- 6) Dilute aqueous sodium chloride –  $NaCl_{(aq)}$
- Anode: .....
  - Cathode: .....
- 7) Aqueous Copper(II) sulphate –  $CuSO_{4(aq)}$
- Anode: .....
  - Cathode: .....
- 8) Concentrated hydrochloric acid –  $HCl_{(aq)}$
- Anode: .....
  - Cathode: .....
- 9) Aqueous silver nitrate –  $AgNO_{3(aq)}$
- Anode: .....
  - Cathode: .....
- 10) Dilute sulphuric acid –  $H_2SO_{4(aq)}$
- Anode: .....
  - Cathode: .....

- Scan the QR code given below to view the answers to this assignment.



[http://www.chemist.sg/electro\\_chem/ionic\\_half\\_equations\\_ans.pdf](http://www.chemist.sg/electro_chem/ionic_half_equations_ans.pdf)