3 Reactivity series and Electrochemistry

To Remember.....

- **Electrochemical series.**

Electropositive nature decreases

K > Na > Ca > Mg > Al > Zn > Fe > Ni > Sn > Pb > Cu > Ag > Au

Electropositive nature increases

- A highly electropositive metal can displace less electropositive metal from its salt solution.
- **In galvanic cell**

  Highly electropositive metal – Anode (Oxidation)
  Less electro positive metal – Cathode (Reduction)
  Direction of electron flow – Anode to Cathode

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Cell	Energy change
Galvanic cell	Chemical energy to electrical energy
Electrolytic cell	Electrical energy to chemical energy

- **Electrolysis of molten sodium chloride**

Reaction		Products	
Anode	Cathode	Anode	Cathode
Oxidation $2Cl - 2e^- \rightarrow Cl_2$	Reduction $Na^+ + 1e^- \rightarrow Na$	Chlorine (Cl_2)	Sodium(Na)

Each question from 1 to 4 carries 1 marks

1. Which of the following metals can displace Fe from $FeSO_4$
   (Ag, Cu, Au, Zn)
2. Electrode at which oxidation takes place is called ----------
3. In Fe-Cu Cell, which electrode acts as anode?
4. Which is the product obtained at the anode during the electrolysis of molten sodium chloride?

Each question from 5 to 6 carries 2 marks

5. $Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag$

a) Name the type of reaction takes place here.

b) Write down reduction reaction in the above reaction ?

6. $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

a) Which ion is responsible for the blue colour of $CuSO_4$ solution ?

b) Write down the oxidation reaction takes place here ?

Each question from 7 to 8 carries 3 marks

7. Electrolysis of molten sodium chloride (NaCl) is conducted.

a) Which are the ions present in the molten sodium chloride?

b) Which ion is attracted towards positive electrode ?

c) Write down the reaction takes place in cathode ?

8. Analyse the following reactions and answer the following questions.

(Hint : Oder of reactivity Mg>Zn>Fe>Cu)

Testtube1 : A copper rod is dipped in $FeSO_4$ solution

Testtube 2 : A Zinc rod is dipped in $FeSO_4$ solution

a) In which test tube does displacement reaction take place ? Give reason ?

b) Write the redox reaction taking place here

Each question from 9 to 10 carries 4 marks

9. Fe rod is dipped in $CuSO_4$ Solution.

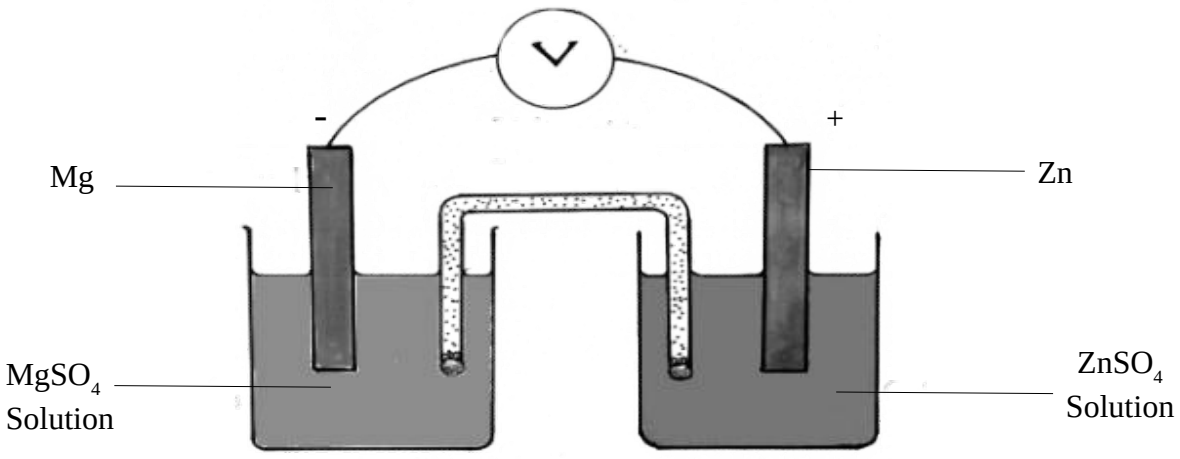
a) What changes takes place in the Fe rod after some time ?

b) Which metal undergoes oxidation ?

c) If Ag rod is used instead of Fe, does displacement reaction takes place ? Give reason?

10. A picture of galvanic cell is given below

(Hint:- Reactivity- Mg > Zn)



a) Which is the energy change takes place in the galvanic cell ?

b) Write down the reaction takes place at cathode ?

c) Which electrode acts as anode ?

Answer Key

Qtn No	Answer Key/ Value Points	Score	Total Score
1	Zn	1	1
2	Anode	1	1
3.	Fe	1	1
4.	Cl_2(Chlorine)	1	1
5.	a) Displacement reaction b) $2Ag + 2e^- \rightarrow 2Ag$	1 1	2
6	a) Cu^{2+} b) $Fe \rightarrow Fe^{2+} + 2e^-$	1 1	2
7.	a) Na^+, Cl^- b) Cl^- c) $Na+ 1e^- \rightarrow Na$	1 1 1	3
8	a) Test tube -2, Zn more reactive than Fe b) $Zn + Fe^{2+} \rightarrow Zn^{2+} + Fe$	1 1	2
9.	a) Cu deposited over Fe rod b) Fe c) If Ag is used instesd of Fe displacement reaction does not takes place. Reactivity of Ag is less than Cu	1 1 1 1	4
10.	a) Chemical energy is converted to electrical energy. b) $Zn^{2+} + 2e^- \rightarrow Zn$ c) Mg d) $Mg + Zn^{2+} \rightarrow Mg^{2+} + Zn$	1 1 1 1	4