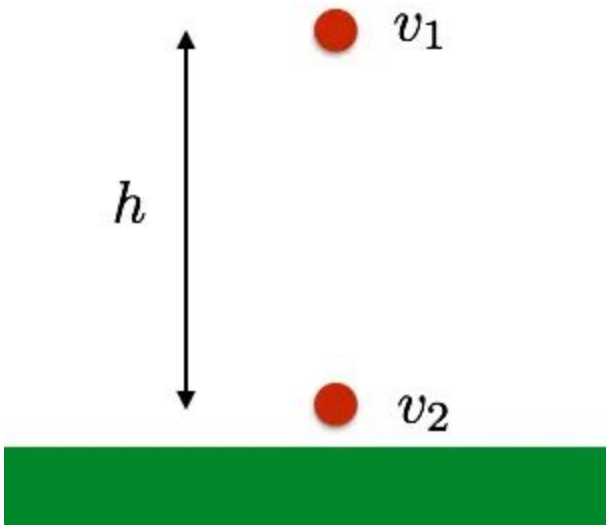
Unit 19.1 Handout

EMF and the Standard Cell Potential

EMF stands for _____ _____, which is the _____ supplied by a source divided by the _____ _____ transported through the source.

Figure 1.



The top has a _____ potential energy (PE) than the bottom one, and the _____ between the two is deemed as the _____ _____. Once a suitable pathway is present, electrons flow from the _____ PE to the _____ PE. In a _____ cell, the ____ is equal to the potential difference for _____ current going through the cell. The EMF is the _____ voltage that can be delivered by the cell.

A _____ _____ is generated when electrons from the anode (negative electrode) move to the cathode (positive electrode). The cell potential of a voltaic cell is therefore defined as the potential difference between the cathode and the anode when the cell is operating (current flow). Therefore, there is always ____ than maximum voltage being delivered by the cell when there is a cell potential as there is a _____.

Under standard conditions (25 degrees celsius and _____ for reactants and _____ for gaseous reactants), in order to calculate the standard cell potential, what formula is used? What do the different parts of the formula represent?

For a galvanic cell, the most positive electrode value is the _____ electrode and the least positive is the _____ electrode.

It is accepted that all standard electrode potentials are formulated as _____ reactions.

The Standard Hydrogen Electrode

It is impossible to measure the electrode potential of a lone _____ _____, as to measure the electrode potential there must be a potential _____ _____ for the present electrons. This requires two set ups. Therefore, electrode potentials are measured using an agreed standard, which is the _____ _____ _____ (_ _ _). Therefore, the standard electrode potential of an electrode is essentially the potential voltage of the reduction equation (half equation) for the electrode measured relative to the SHE. E of the SHE half equation is _ V for all temperatures. The potentials of other electrodes are then compared to the SHE.

What is the half reduction equation for SHE?

The standard electrode potential of another half cell is determined by connecting the half cell to the SHE under standard conditions, using a _____ _____, _____ _____ ,and a _____ to measure the voltage. The cell potential can then be determined. This is shown with copper below.

Gibbs Free Energy

What is the equation for standard change in Gibbs Free Energy (___)?

If $\Delta G^{\ominus}$ is negative, the reaction is _____ (_____ cell). If positive, it is a _____ reaction (_____cell).