



Chemistry

Class-9

Chapter-7

Chemical reactions

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Lecture sheet with worksheet-2

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Unit-1: Endothermic reactions and Exothermic reactions

Any chemical reaction is accompanied by/with heat change.

The heat change may occur in two ways- they are Exothermic and Endothermic reactions.

An endothermic reaction is one which absorbs energy (heat)causing a temperature drop in the surroundings.

In an experiment, an amount of water is taken in a test tube and its temperature is measured with a thermometer. An amount of solid NH₄Cl is added to it and the temperature is measured again. The second temperature reading is lower than the previous one. This experiment proves that the reaction is endothermic.

An exothermic reaction is one

H' stands for 'heat' and the 'ΔH' represents the heat/enthalpy change in a chemical reaction. The units of 'ΔH' are kJ mol⁻¹

Its value is positive for an endothermic reaction and negative for an exothermic reaction.

Exothermic energy changes are shown as negative because energy has been transferred from the chemicals (system) to surroundings.

Endothermic energy changes are shown as positive because energy has been transferred from surroundings to the chemicals (system).

Example 1:



This means that when

1 mole of hydrogen is burnt completely in air 242 kJ heat is given out to the surroundings.

Example 2:



This means that when

..... of nitrogen is reacted with oxygen..... kJ heat is..... from the surroundings causing in the surroundings.

Physical changes (phase changes) can be also endothermic and exothermic. When something freezes, it goes from liquid to solid, then energy(heat) is given out from liquid to surrounding. So, freezing is exothermic.

Exercise-1:

1. Make a comparison between exothermic and endothermic reactions.

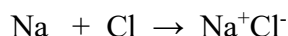
Unit-2: Redox reactions (Oxidation-reduction reactions)

The simple definition of redox reaction is, in redox reaction electrons move between atoms.

The oxidation is loss of electrons and the reduction is gain of electrons.

[We can use two terms 'Oil' and 'Rig' as a trick to remember what is oxidation and reduction. 'Oil' means oxidation is loss of electrons and 'Rig' means reduction is gain of electrons.]

Let's take a chemical reaction where oxidation and reduction are taking place.



Sodium and chlorine coming together to make sodium chloride. NaCl is an ionic compound which means it is made up of ions (Na^+ and Cl^-) and these two ions attach together because these have opposite charges and opposite charges attract. But Na and Cl didn't always have charges. Before they combined, they have no charge. They are two electrically neutral atoms. So, in order to come together and make sodium chloride, these two atoms have to get charges.

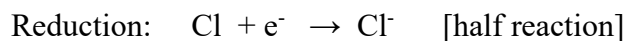
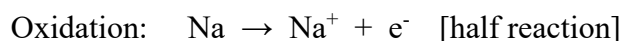
So, sodium gives one of its electrons to chlorine and the charges come in and form ions. Na atom loses one electron so it becomes Na^+ and Cl atom gains an electron and becomes Cl^- . So, these two ions with opposite charges attach making NaCl.

Now using the oxidation and reduction concept we can describe what is happening to Na and Cl.

Na is giving up an electron, it is losing an electron. That means Na is undergoing oxidation and being oxidized.

On the other hand, Cl is an electron, it is an electron. That means Cl is undergoing and being

So, there is oxidation and reduction going on in a chemical reaction. We can express the oxidation and reduction writing chemical equations



These two are called half reactions, because they individually can represent half process of the whole reaction. So, for every redox reaction we can write two half reactions. And now we can easily understand oxidation and reduction always have to happen at same time because if one atom is gaining an electron, that electron had to come from somewhere, so another atom had to give up that electron. Atoms cannot gain electrons from air. In case of NaCl, the electron that Cl atom is gaining, is the same electron that Na atom was releasing. So, oxidation and reduction have to always happen at the same time in parallel.

Exercise-2:

1. What is meant by redox reaction?
2. What is oxidation and reduction?
3. Why oxidation and reduction are called half reactions?
4. Oxidation-reduction occurs simultaneously. Analyze.