

1. Chemical composition of cytoplasm and nucleoplasm:

Cytoplasm

It consists of cytosol and the cellular organelles, except the cell nucleus. The cytosol is made up of water, salts, organic molecules and many enzymes that catalyse reactions. The cytoplasm is composed of ions and soluble macromolecules like enzymes, carbohydrates, different salts and proteins, as well as a great proportion of RNA. The organelles such as the mitochondria, the chloroplast, lysosomes, peroxisomes, ribosomes, vacuoles, cytoskeletons, and complex cell membrane structures like the endoplasmic reticulum in the cytoplasm are insoluble.

Nucleoplasm

Here, many substances such as nucleotides necessary for purposes such as the replication of DNA and enzymes which direct activities that take place in the nucleus are dissolved in the nucleoplasm.

2. Phosphoprotein activity in nucleoplasm

A phosphoprotein + H_2O = a protein + phosphate.

Together with protein kinases, these enzymes control the state of phosphorylation of cell proteins and thereby provide an important mechanism for regulating cellular activity.

3. How the histone protein makes DNA in condensed form:

The double helix of DNA is highly negatively charged due to all the negatively charged phosphates in the backbone. All that negative charge must be counterbalanced by a positive charge, and the cell makes proteins called histones that bind DNA and aid in DNA's packaging.

Histones are positively charged proteins that wrap up DNA through interactions between their positive charges and the negative charges of DNA. Double-stranded DNA loops around 8 histones twice, forming the nucleosome, which is the building block of chromatin packaging.