* *Get into groups of two and try to fill in the missing verbs you have already noticed when you were listening to the explanation!*

**Background Information:**

The abbreviation **DNA** \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the English name *deoxyriboncleic acid* (in German *Desoxyribonukleinsäure*) and is more commonly \_\_\_\_\_\_\_\_\_\_\_\_\_ than the German equivalent **DNS**.   
The DNA, a nucleic acid, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a double-helix of long chain molecules. The “building blocks” are nucleotides. Each nucleotide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a phosphate rest, the sugar Deoxyribose and one of four organic bases, Adenin (A), Thymin (T), Guanin (G) and Cytosin (C).   
Animals, plants and fungi \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of eukaryotic cells, where most of the DNA is organized in chromosomes within a nucleus (Zellkern). A small part \_\_\_\_\_\_\_\_\_\_ in mitochondria (the “power station of the cell”). In addition, plants have DNA in Chloroplasts, which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for photosynthesis. Procaryotes, such as bacteria, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a nucleus. Rather, their DNA \_\_\_\_\_\_\_\_\_\_\_ in the cytoplasm. <https://en.wikipedia.org/wiki/DNA> (23 March 2024)

To \_\_\_\_\_\_\_\_\_\_ the DNA, both the membrane of the cell and nucleus have to be \_\_\_\_\_\_\_\_\_\_\_\_. The mortar is supposed to mechanically \_\_\_\_\_\_\_\_\_\_\_the cells. Next, a common detergent, like dish soap, \_\_\_\_\_\_\_\_\_\_\_\_\_ the phospholipic double membrane. In addition, enzymes \_\_\_\_\_\_\_\_\_\_\_\_\_ through proteases. Salt \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_this effect. High temperature is important to \_\_\_\_\_\_\_\_\_\_\_\_\_ the process and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DNAses (enzymes which decompose DNA). Subsequent cooling is necessary to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the DNA.

*Chemicals:* Sample: Vegetables (onion, cucumber, zucchini, peppers, tomato,…). Fruits (kiwi, banana, strawberry,…)

dish soap

NaCl

Ethanol 96%

Ammoniummolybdad-solution

Aqua dest.

*Equipment:* water bath with thermometer

filter

beaker

mortar

funnel

*The working steps are out of order. Match the correct sentences with the pictures! Cut them out and stick them next to the right picture!*

**Working Steps:**





















*Working steps:*

|  |
| --- |
| Crush, mix and grind the sample in a mortar: the cells must be destroyed before DNA may be isolated. |
| Keep the mixture in the 90°C water bath for 15 minutes (for further destruction of cells) |
| Fill 50ml of Ethanol into a bottle and put it into the freezer |
| Precipitate the DNA: Take the sample and the cold Ethanol out of the freezer and slowly pipette ice cold Ethanol into the sample letting the Ethanol run down the tube wall; you should see white threads/flakes |
| Put one teaspoon of sample into a test tube |
| Put the test tube into the ice (freezer) for a few minutes |
| Prepare the detergent: mix 40ml dish soap, 12g NaCl and 360ml Aqua dest (this solution is enough for all students) |
| Now it’s time to filter the sample: collect the filtrate in a screw-top test tube (Schraubreagenzglas) – there should be about 5-10ml of filtrate |
| and add the same amount of detergent |
| Mix it well |

* *Now you have instructions on how to isolate the DNA! While trying it by yourself your partner should make a* ***video*** *of you with the smartphone. Imagine you need to explain the attempt to your class mates. Please* ***comment on every step*** *you do! Take a photo of the isolated DNA! Switch when you are finished!*

*At the end, you should have background information, the working steps of the DNA-isolation, a video of yourself and a photo of the DNA. Stick everything into your “protocol book”. Upload the video on Moodle!*

I hope you will enjoy these activities 😊

**Vocabulary:**

consist bestehen

extract extrahieren

dissolve auflösen, lösen

destroy zerstören

digested verdaut

increase erhöhen, steigend, zunehmen

accelerate beschleunigen

denaturate denaturieren

preserve erhalten, bewahren

precipitate ausfallen

organized organisiert, gegliedert

based beruhen auf, basieren auf

built up aufgebaut

responsible verantwortlich

float schweben, treiben, schwimmen

dissolve auflösen

**Additional Media:**

* [DNA Isolation Step 1: Preparing the Sample](https://www.youtube.com/watch?v=xlrwef2Y3f0)
* [DNA Isolation Step 2: Extracting the DNA](https://youtube.com/watch?v=iYaxOwZLIAk)
* [DNA Isolation Step 3: Precipitating the DNA](https://youtube.com/watch?v=y7kny3Xy4k4)
* [DNA Isolation Step 4: Cleaning & Eluting the DNA](https://www.youtube.com/watch?v=buzWMKIHbBI)