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On the trail of viruses: understanding virus research

Worksheet A: Virus video XFEL

Research at European XFEL and structural elucidation of SARS-CoV-2 proteins

Open questions

1. Describe the purpose of European XFEL and why researchers from all over the world use this facility.

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2. Explain why the structure of proteins is so important for understanding their function.

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3. How does the study of the PLpro and Mpro (also known as M) proteins help to develop strategies against the coronavirus?

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4. Explain the process by which the structure of protein crystals is visualised with the help of the European XFEL.

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5. Why are extremely short and high-frequency X-ray pulses necessary to observe molecular processes?

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Multiple-choice questions

1. What is the main objective of the experiments at the European XFEL in relation to SARS-CoV-2?
    a) The production of vaccines
    b) The development of electron microscopes
    c) Understanding protein structure for the development of drugs
    d) Research into plant proteins

2. What is the function of the PLpro and Mpro proteins in the life cycle of the coronavirus?
    a) They help the virus to penetrate the cell
    b) They cut amino acid chains into functional pieces
    c) They destroy the immune system
    d) They form the outer shell of the virus

3. Why are proteins crystallised before they are examined with the X-ray laser?
    a) Crystals are easier to transport
    b) Atoms can only be made visible in crystal form
    c) The ordered structure provides
    d) Crystals react better to light.

4. What makes the X-ray pulses of the European XFEL so special?
    a) They are particularly long and high-energy
    b) They are ultra-short and enable sharp images of fast processes.
    c) They are invisible to detectors.

d) They have a low frequency.

5. What is a "molecular movie" in the context of research at the European XFEL?
   a) An animated educational film about molecules
   b) A series of still images showing how a protein reacts
   c) A film documenting the production of medicines
   d) A computer simulation of virus replication

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