Proteins

TOPIC CATALOG

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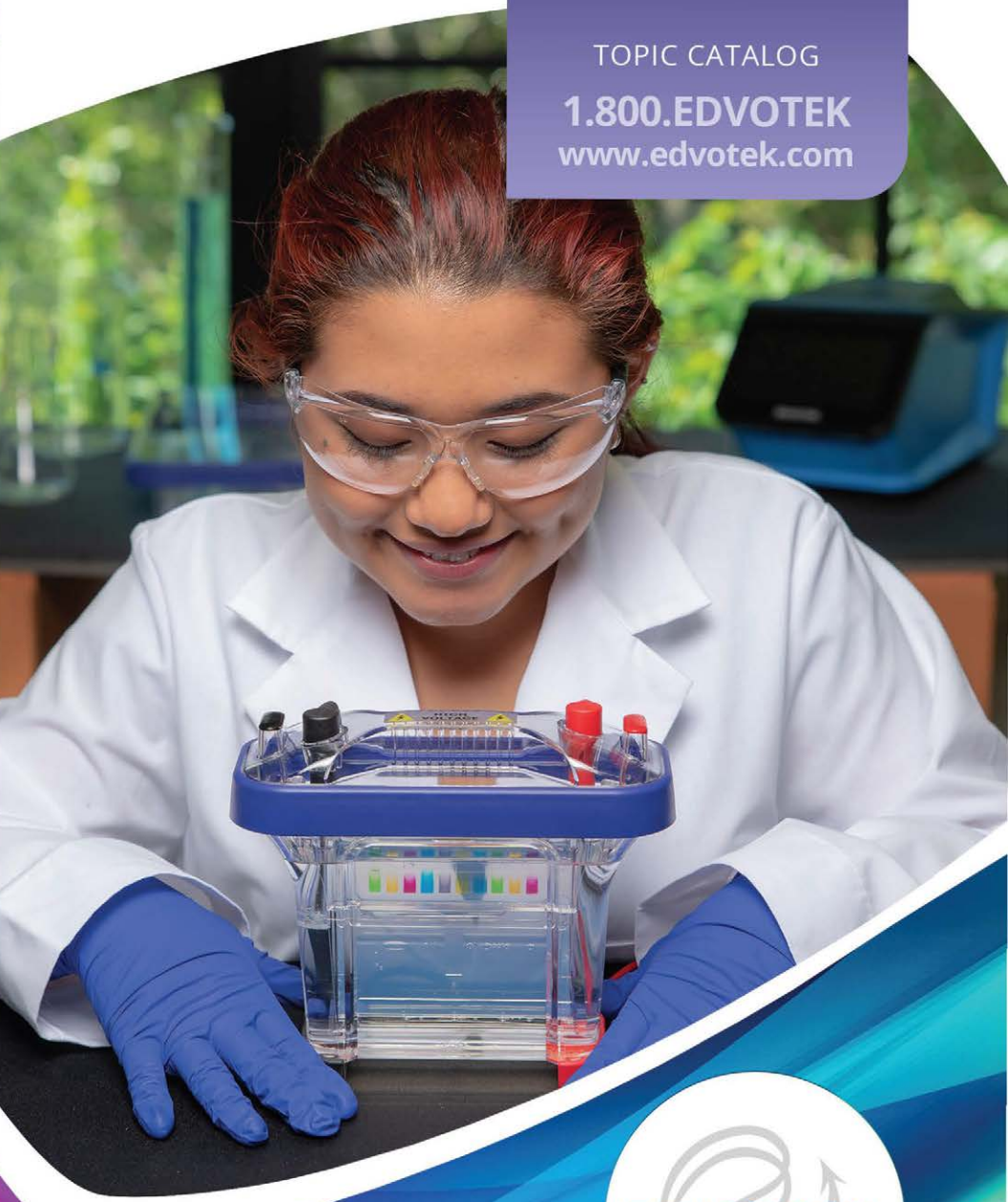

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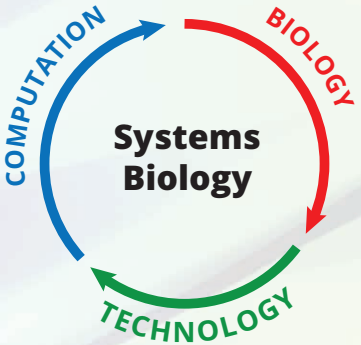
Proteins and Systems Biology

Alongside the genome, scientists now talk of the proteome (proteins), transcriptome (mRNA) and even the metabolome (metabolic pathways). These individual fields are gradually coming together (along with bioinformatics and other computer based technologies) under a single umbrella called "systems biology".

The idea behind systems biology is that you must study all parts of the organism, from the molecular and cellular level, through to the highest level together to understand the complex multi-level interactions that govern what we call life. The theory underpinning systems biology is the old adage that the whole equals more than the sum of the parts.

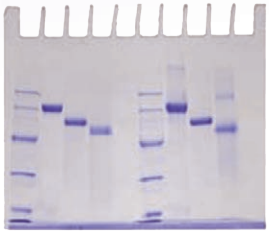
A key element prescribes that component parts, when combined together, have what are called "emergent properties". The Institute for Systems Biology in Seattle, uses the (non-eco) light bulb to explain this. When the parts of such a light bulb are taken individually (tungsten wire, metal cap and glass bulb), they don't give a clue that together they produce the emergent property of light! Complex systems (like life) have even less predictable emergent properties so it is necessary to study the whole, as well as the parts, for a full understanding.

Understanding the proteome is one piece of systems biology. Within an organism, all cells contain the same DNA. However, there are many different cell types, because each cell expresses specific proteins. Identifying these proteins and understanding how they work are critical for having a full view of biological systems.



SDS-PAGE Electrophoresis

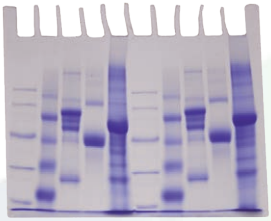
Determination of Protein Molecular Weight



Using prestained LyphoProteins™, subunit molecular weights are determined using denaturing SDS vertical polyacrylamide gel electrophoresis. Prestained Proteins with unknown molecular weights are assigned molecular weights based on the relative mobility to prestained standard protein markers.

Cat# 153 *For 6 groups*

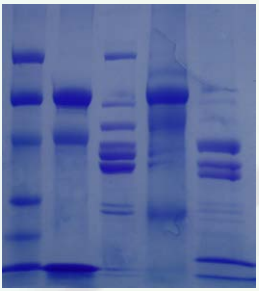
Survey of Protein Diversity



Learn about the diversity of proteins by studying the electrophoretic profiles of various sources. Your students will separate proteins from bacterial, plant, serum, and milk proteins alongside a standard protein marker.

Cat# 150 *For 6 groups*

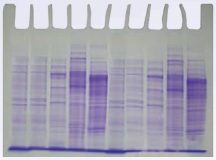
NEW! Cell Types in the Brain



The brain is an incredibly complex organ and is responsible for regulating almost everything within our body. It allows us to form complex thoughts, read, write, move, breathe, play sports, and listen to music. It does this through a network of cells working together to function. The objective of the experiment is for students to examine the differences between cell types in the brain based on their profiles of proteins.

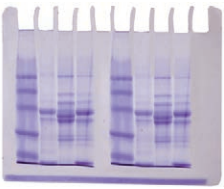
Cat# 1110 *For 6 groups*

Fingerprinting of Bacterial Proteins



In this experiment, total protein extracts from several bacterial sources are compared. The unique patterns of protein bands, obtained by SDS vertical polyacrylamide electrophoresis, can be used to identify various bacterial strains.

Cat# 252 *For 6 groups*

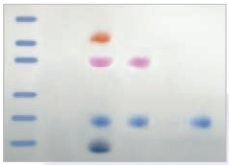


Diversity of Fish Proteins

Study the diversity of fish with these pre-stained, lyophilized proteins. Total protein from Perch, Walleye and Salmon is extracted and pre-stained using an indicator dye. Each fish protein sample has a characteristic banding pattern when separated by denaturing SDS-polyacrylamide gel electrophoresis, which can be used to identify the specific species.

Cat# 253 *For 6 groups*

Simulation of HIV Detection by Protein Electrophoresis



Human Immunodeficiency Virus (HIV) causes acquired immune deficiency syndrome (AIDS), a serious disease that suppresses a patient's immune system and leaves them susceptible to infections. In this experiment, students will use SDS-PAGE to simulate the identification of HIV proteins in simulated patient samples. The results of this test are used to diagnose an HIV infection.

Cat# 151 *For 6 groups*

MV10 Vertical Electrophoresis Apparatus

The latest in electrophoresis design! Our newly redesigned MV10 gel tank is designed for easy separation of proteins on polyacrylamide gels utilizing our unique gel support cassette clip. It allows gels to be easily inserted or removed and holds them in place securely. The MV10 unit holds one 9 x 10 cm gel cassette and can accommodate most precast polyacrylamide gels.

Cat# 581

DuoSource™ 150

75/150 V, for 1 or 2 Units

Cat# 509

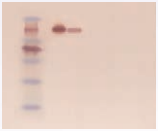
QuadraSource™

10-300 V, for 1 to 4 Units

Cat# 5010

Western Blotting

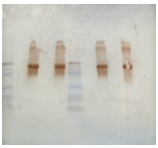
Western Blot Analysis



In Western blot analysis, protein identification is based on antibody and antigen reactions. Proteins are separated on polyacrylamide gels and transferred (blotted) to a nylon membrane. The membrane is exposed to solutions containing primary antibody, followed by a secondary antibody coupled to an enzyme. The membrane is then soaked in a substrate solution to develop the color reaction, which results in identification of the antigen protein band. The molecular weights of the visible bands are measured using prestained protein markers of known molecular weight. This kit does not require an electrotransfer apparatus.

Cat# 317 *For 6 groups*

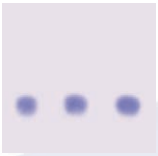
NEW! Detecting Risk Factors for Alzheimer's Disease Using Western Blot



The objective of this experiment is for students to understand the theory and application of Western blotting as used in a clinical setting. Students will perform a Western blot to determine simulated clinical trial participants' risk of developing Alzheimer's Disease.

Cat# 1115 *For 6 groups*

Simulation of HIV Detection by Western Blot



One assay used to confirm a positive HIV ELISA result is the Western blot. Students separate protein samples from hypothetical patients on agarose gels, transfer the samples to a membrane and detect the simulated HIV proteins. This kit is an introductory level experiment. For a comprehensive advanced course, we recommend Cat. #317.

Cat# 275 *For 6 groups*

Enzymes

Principles of Enzyme Catalysis

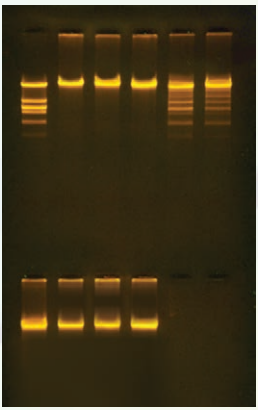
This easy and safe experiment allows your students to learn about enzyme catalysis, the nature of enzyme action and protein structure-function relationships. Students will perform an enzyme assay and determine the rate of the enzymatic reaction. This experiment uses a safer system that eliminates the need for sulfuric acid and potassium permanganate.

Cat# 282 *For 10 groups*

Purification of the Restriction Enzyme *Eco RI*

In this experiment, students actually purify the restriction enzyme, *Eco RI*! This procedure utilizes an ion exchange chromatography step for *Eco RI* purification. Column fractions are assayed for the enzyme using Lambda DNA, and digestion products are identified by agarose gel electrophoresis. Fractions that contain *Eco RI* are identified and pooled. The total and specific activities are calculated. Recommended for college level courses.

Cat# 302 *For 5 groups*



Chromatography

Ion Exchange Chromatography

Most molecules have a net charge within a pH range of 2 to 10. When the pH is altered, the net charge on molecules can change drastically. In this experiment, a mixture of two chemicals is absorbed onto a solid support ion-exchange column and separated during elution under conditions that influence their net charge.

Cat# 243 *For 10 groups*

Principles of Gel Filtration Chromatography

Introduce chromatographic separation to your class and show them how dyes of different colors separate on the basis of their size and shape. This experiment contains materials for dye separation which include dye sample, elution buffer and plastic disposables. Columns may be rinsed and reused.

Cat# 108 *For 10 groups*

Purification & Size Determination of Green & Blue Fluorescent Proteins

When bacteria are used to make medicinally useful proteins by transformation, the protein of interest must be separated from all of the other cellular proteins. In this experiment, the unique fluorescent properties of GFP and BFP will be used to purify them away from an *E. coli* extract. The column fractions containing GFP or BFP will be identified by fluorescence and then purified. As an optional activity, purified protein fractions can be separated by SDS polyacrylamide gel electrophoresis (SDS-PAGE) to estimate the purity and size of the GFP and BFP proteins.

Cat# 255 *For 6 groups*

Affinity Chromatography of Glucose Binding Proteins

In this experiment, students will prepare a seed extract from Jack Bean Meal, fractionate the extract by affinity chromatography, and elute the bound glucose binding protein. The presence of biological activity is determined by an immunoblot enzyme assay.

Cat# 277 *For 10 groups*

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