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|  **Overall Expectations** | **Specific Expectations** |
| A1. Demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating) B3. Demonstrate an understanding of the structures and functions of biological molecules, and the biochemical reactions required to maintain normal cellular functionB2. Investigate the chemical structures, functions, and chemical properties of biological molecules involved in some common cellular processes and biochemical reactions | A1.1 Formulate relevant scientific questions about observed relationships, ideas, problems, or issues, make informed predictions, and/or formulate educated hypotheses to focus inquiries or research A1.2 Select appropriate instruments (e.g., sampling instruments, a microscope, a stethoscope, dissection instruments) and materials (e.g., dichotomous keys, computer simulations, plant cuttings), and identify appropriate methods, techniques, and procedures, for each inquiry A1.4 Apply knowledge and understanding of safe laboratory procedures when planning investigations by correctly interpreting Workplace Hazardous Materials Information System (WHMIS) symbols; by using appropriate techniques for handling and storing laboratory equipment and materials and disposing of laboratory and biological materials (e.g., preserved specimens); and by using appropriate personal protectionA1.12 Use appropriate numeric, symbolic, and graphic modes of representation, and appropriate units of measurements (e.g., SI units, imperial units) B3.1 Describe the structures and functions of important biochemical compounds, including carbohydrates, proteins, enzymes, and lipids B2.3 Construct and draw three-dimensional molecular models of important biochemical compounds, including carbohydrates, proteins, lipids, and nucleic acidsB2.4 Conduct biological tests to identify biochemical compounds found in various food samples, and compare the biochemical compounds found in each food to those found in others  |
| **Concepts** |
| **Terminology** | **Theory** |
| * Macromolecule
* Carbohydrate
* Protein
* Lipid
 | * Minerals
* Enzymatic activity
* Enzyme
 | * The structure and function of the main macromolecules
* The functional groups
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| **Material to prepare** |
| * Context
* Copy of activity
* Copy of assessment grid
* Activity
* Material according to the types of evaluation offered

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| Material/Perishable |
| * Whole milk (about 120 mL)
* Skim milk (about 20 mL)
* Whey (about 20 mL)
* Curd (about 20 mL)
* Glucose solution
* Vegetable oil
* Egg white
* A sheet of brown paper
* 6 3 mL plastic pipettes
* 2 500 mL beakers
* 1 glass rod
* A 10 mL and 100 mL graduated cylinder
* A test tube holder
* Test tubes
* Pliers
 | * Filter paper (or nylon filter)
* Benedict’s solution (Lugol or Fehling’s liquor)
* Sudan III dye
* Ammonium oxalate
* Silver nitrate
* Ammonium molybdate
* Concentrated nitric acid (Protein indicator tape or NaOH (1 mol/L) and CuSO4 (0.5%)
* Acetic acid 1 mol/L
* Distilled water
* Water bath
* Hot plate
* 1 funnel
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* Pushing further
* Computer for analysis and report
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| **Context*** Presentation of assignment
* Preparation of whey
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| **Activity — Identification des macromolécules et des minéraux*** Group the students
* Divide the work tables according to the selected variables
* Have students complete the lab protocol.

**Note:** different products are mentioned for certain tests. Select the protocol to use. |
| **Pushing further*** Lead a discussion on the expression of different milk proteins in A2 milk. How might this milk be better tolerated by lactose intolerant individuals?
* As identified in the lab, whey has real food value. Research and present products derived from whey. Discuss the environmental impacts of reusing cheese industry residues or waste.
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| **Assessment*** Summative: lab work — lab report
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| **Resources*** **Protocol example**
* **Material supplier**
* Internet
* [Le lait et sa coagulation](https://www.youlab.fr/blog/ressources-scientifiques-bibliographie/le-lait-et-sa-coagulation/) *[*[*https://www.youlab.fr/blog/ressources-scientifiques-bibliographie/le-lait-et-sa-coagulation/*](https://www.youlab.fr/blog/ressources-scientifiques-bibliographie/le-lait-et-sa-coagulation/)*]*
* P[rotein](https://www2.gnb.ca/content/gnb/fr/ministeres/10/agriculture/content/betail/bovins/proteines.html) *tes [*[*https://www2.gnb.ca/content/gnb/en/departments/10/agriculture/content/livestock/cattle/protein\_test.html*](https://www2.gnb.ca/content/gnb/en/departments/10/agriculture/content/livestock/cattle/protein_test.html)*]*
* [Le lait un liquide biologique complexe](https://www.ac-strasbourg.fr/fileadmin/pedagogie/biotechnologies/Enseignement_technologique/Ressources_pedagogiques/Concours_general_STL/CGbio_ecrit_2015_docts.pdf) *[*[*https://www.ac-strasbourg.fr/fileadmin/pedagogie/biotechnologies/Enseignement\_technologique/Ressources\_pedagogiques/Concours\_general\_STL/CGbio\_ecrit\_2015\_docts.pdf*](https://www.ac-strasbourg.fr/fileadmin/pedagogie/biotechnologies/Enseignement_technologique/Ressources_pedagogiques/Concours_general_STL/CGbio_ecrit_2015_docts.pdf)*]*
* [Étude de la fabrication du St-Nectaire](https://www.ac-strasbourg.fr/fileadmin/pedagogie/biotechnologies/Enseignement_technologique/Ressources_pedagogiques/Concours_general_STL/CGbio_admission_2015_docts.pdf) *[*[*https://www.ac-strasbourg.fr/fileadmin/pedagogie/biotechnologies/Enseignement\_technologique/Ressources\_pedagogiques/Concours\_general\_STL/CGbio\_admission\_2015\_docts.pdf*](https://www.ac-strasbourg.fr/fileadmin/pedagogie/biotechnologies/Enseignement_technologique/Ressources_pedagogiques/Concours_general_STL/CGbio_admission_2015_docts.pdf)*]*
* Whey powder, sweet *[*[*https://feedtables.com/content/whey-powder-sweet*](https://feedtables.com/content/whey-powder-sweet)*]*
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