



SUPPLEMENTARY MATERIAL TO  
**Chemistry educational outcomes and standards in Serbia and  
Montenegro. Analysis of the teachers' attitudes and high school  
students' achievements**

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**TABLE S-II.** Defined learning outcomes for the subject Chemistry, topic “Lipids” per a school

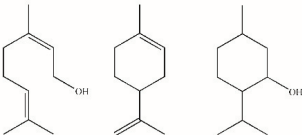
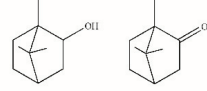
Educational outcomes	
Grammar school in Serbia	Grammar school in Montenegro
-defines lipids according to their chemical composition; -states the role of fats, oils and waxes; -recognizes biologically important compounds as reserve building and energy value compounds; -knows the meaning of essential fatty acids; -knows food sources of biologically important compounds; -connects the structure of lipids with properties and roles in living organisms.	-knows the structure of chemical compounds that make up the composition of triacylglycerols, phospholipids and sphingolipids; -observes and explains experiments (acid-base hydrolysis of fats, acrolein test, and proving cholesterol); -writes the chemical formula of cholesterol and describes its important metabolites; -analyses the biological role of triacylglycerol, phospholipids and sphingolipids; -presents on the topic: "Fats and oils in the diet - advantages and disadvantages".

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**TABLE S-II.** Framework formulations of questions from the interview

<b>Questions</b>
<p>Are you informed about educational standards and outcomes? How are you informed about the changes that have occurred during the transition to standards and outcomes-based education? Were teachers sufficiently involved in the process of determining standards and student achievement outcomes? Why do you think so?</p> <p>From your point of view, what is the main purpose of implementing educational standards and outcomes? What innovations bring the application of educational standards and outcomes? Do you consider the implementation of outcomes and standards as a positive change in the education process? In your opinion, why they are good or bad?</p> <p>Teaching should enable the realization of the potential of each student. Do educational standards and outcomes enable this? What is the main intention of stating educational standards and objectives? Who do you think is most responsible for fulfilling the defined outcomes and then the standards?</p> <p>Who benefits from education based on educational standards and outcomes? In what way? Do you think that you are successful/unsuccessful in implementing teaching based on standards and outcomes?</p>

TABLE S-III. Question from the knowledge test

Question No.	Question
1.	<p data-bbox="592 555 1225 577">Based on the given structures, which lipids can be saponified?</p> <div data-bbox="582 616 1241 1064"> <p>a)</p> <math display="block">\begin{array}{c} \text{CH}_2-\text{O}-\overset{\text{O}}{\parallel}{\text{C}}-(\text{CH}_2)_{16}-\text{CH}_3 \\   \\ \text{CH}-\text{O}-\overset{\text{O}}{\parallel}{\text{C}}-(\text{CH}_2)_{14}-\text{CH}_3 \\   \\ \text{CH}_2-\text{O}-\overset{\text{O}}{\parallel}{\text{C}}-(\text{CH}_2)_7-\text{CH}=\text{CH}-(\text{CH}_2)_7-\text{CH}_3 \end{array}</math> <p>b)</p>  <p>c)</p> <math display="block">\begin{array}{c} \text{CH}_3-\text{O}-\overset{\text{O}}{\parallel}{\text{P}}(\text{OH})-\text{CH}_2-\text{CH}_2-\text{N}(\text{CH}_3)_2 \\   \\ \text{CH}-\text{NH}-\overset{\text{O}}{\parallel}{\text{C}}-\text{R} \\   \\ \text{CH}_2-\text{CH}=\text{CH}-(\text{CH}_2)_{12}-\text{CH}_3 \end{array}</math>  </div>
2.	Based on the chemical structure of fatty acids, explain why they dissolve in non-polar solvents and not in water.
3.	What is the main role of fats and oils in our body? List a few food sources that are rich in fats and oils.
4.	Polar bears can survive in extreme cold. One of the reasons is?