



Chemical Institute of Canada | **For Our Future**  
Institut de chimie du Canada | **Pour notre avenir**

**THE 2019 CANADIAN CHEMISTRY CONTEST**  
for High School and CEGEP Students

**PART B – EXTENDED RESPONSE SECTION (90 minutes)**

Students will answer **TWO** questions as follows: all students **must** answer the experimental design question 1; students have the choice between answering **either** question 2 **or** question 3. For each question, students should write a scientific essay including appropriate equations, formulae and diagrams. Each essay is of equal value. Allocate approximately equal time to each question. Scorers will consider the accuracy and quality of the information and the presentation of the responses. A clear, concise, well-organized piece of written work will be rated more highly than a long rambling one. A scientific calculator is allowed. No phones or communication devices are allowed.

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**1) Experimental Design: Heat of Combustion of Paraffin (mandatory question)**

Design an experiment to measure the heat of combustion of paraffin wax in a candle. You may use any equipment, reagents, and materials typically found in a high school chemistry classroom. In addition, you have an empty soft drink can with two holes, 0.5 cm in diameter, on the top. You also have a large empty metal can open at both ends, which you could put around the candle to reduce drafts. On the counter, you have water, a ring clamp, retort stand, ice cubes, a balance, thermometer, graduated cylinders, glass stirring rod and tongs. Clearly present your experimental steps and the reasoning behind them. You must demonstrate a thorough understanding of the experiment you are performing, the data you need to collect, and the data analysis you must perform.

**2) The Chemistry Contributions of Gilbert Lewis**

One of the most recognizable names for high school chemistry students is that of Gilbert Lewis. Young chemistry students start understanding atoms and compounds by drawing Lewis Dot Diagrams. Senior Chemistry students expand their understanding of chemistry by studying Lewis acids and bases. Discuss your understanding of the significance of Lewis' contributions to Chemistry. In your discussion, you should explain Lewis' influence on better understanding chemical structures, bonding, electron transfer and acid base chemistry.

**3) 2019: The International Year of the Periodic Table**

The United Nations, Educational, Scientific and Cultural Organization's (UNESCO) declared 2019 the International Year of the Periodic Table in celebration of the 150<sup>th</sup> anniversary of Dimitry Mendeleev's 1869 creation. UNESCO states: "The Periodic Table of Chemical Elements is one of the most significant achievements in science, capturing the essence not only of chemistry, but also of physics and biology". Discuss the statement UNESCO made about the periodic table and explain why UNESCO claims that the periodic table is one of the most significant achievements in science. Use several concrete examples of the periodic table's importance in chemistry and at least 1 example of the importance of the periodic table in Physics and in Biology.