

## Evaluation grid: development of competency 2

## CHEMISTRY

## LES - Stirling engine

Evaluation Criteria	Indicators	A	B	C	D	E
Formulation of appropriate questioning	Formulation of questioning (Booklet, p.4 and 5)	-Formulates a <b>complete</b> questioning, enriched with related elements associated to the function of the engine. - <b>Questions himself on scientific concepts</b> related to this function.	-Formulates a questioning to outline <b>the</b> essential aspects related to the engine's function.	-Suggests questioning that <b>partly</b> outlines the essential aspects of the engine's function.	-Formulates questions based only on <b>incidental elements</b> .	- <b>Transcribes</b> information related to the engine from the booklet.
	Interim explanation (Booklet, p.4 and 5)	-From the engine's function, highlights <b>known</b> scientific or technological <b>concepts or principles</b> .	-Suggests an interim explanation that <b>correctly</b> describes the engine's function.	-Suggests an initial explanation that allows him to outline <b>some</b> of the essential aspects of the engine's function	- His interim explanation outlines <b>one</b> aspect of the engine's function.	-Suggests an interim explanation <b>without</b> scientific or technological <b>basis</b> .
Use of pertinent concepts, laws models and theories of science and technology.	Correct application of concepts (Booklet, p.20 to 24 and p.25) Key concepts of kinetic theory of gases <ul style="list-style-type: none"> <li>Expansion, diffusion, compression, pressure, effect of temperature, effect of number of molecules</li> <li>Laws implicated : <ul style="list-style-type: none"> <li>Charles' Law</li> <li>Gay-Lussac's Law</li> <li>Boyle-Mariotte's Law</li> <li>General Law of gases</li> </ul> </li> </ul>	-Enumerates the concepts and associates them to the components of the engine. -Transfers the concepts, laws or theories to <b>other applications or phenomena</b> by using the same chemical principles (in the integration phase).	-Enumerates <b>the majority</b> of the concepts at the right time and associates them to the engine's components.	-Mentions <b>obvious</b> concepts at the appropriate time in his comic strip.	-His comic strip mentions <b>one</b> obvious concept.	Does not mention a <b>single</b> studied concept.
Production of pertinent explanations or solutions	Production of explanations (Booklet, p.21 to 24)	-Enriches his explanations with <b>elements complementary</b> to the key concepts.	-Produces <b>coherent explanations for the four times</b> chosen.	- Produces <b>partial explanations for the four times</b> chosen.	-Produces a partial explanation for <b>at least 2 of the 4</b> chosen times.	-His written or sketched explanations <b>allow understanding</b> the engine's function with <b>great difficulty (or do not allow it at all)</b> .
Adequate justification of explanations, solutions, decisions or opinions	Justification based on concepts, laws, models or theories (Booklet, p.21 to 24)	Supplies explanations based on scientific principles <b>going beyond the explicit aspects</b> of the application or phenomenon.	Supplies explanations based <b>especially on scientific or technological principles</b> , drawn from valid information.	<b>Partially</b> justifies his explanations using pertinent concepts, laws and theories.	Justifies his explanations <b>somewhat inappropriately</b> .	<b>Does not</b> justify his explanations at all.
	Mathematical formulation (Booklet, p.21 to 24)	He resorts to mathematical formalism to enrich his explanations (e.g. for this task, <b>right formula or mathematical relationship in the right place</b> )	Uses mathematical formalism that includes minors errors (e.g. <b>error in transcription</b> )	Uses mathematical formalism that includes some important errors (e.g. <b>incorrect formula or mathematical relation in certain places</b> )	Uses <b>inappropriate</b> mathematical formalism.	<b>Does not use</b> mathematical formalism.

Task concerned (page 26): Advantages and disadvantages of the Stirling engine as opposed to internal combustion engines; future of the Stirling engine; function of a refrigeration machine.

Sources that could be used: Web sites, magazine articles, school manual (?)

Expected production: Poster or slide show (the latter was chosen by the team that was trying the LES).

Evaluation criteria	Indicator	A	B	C	D	E
Adequately interprets messages of scientific and technological character.	Selection of useful elements	Enhances the quality of communication by using complementary elements.	In the suggested sources, selects appropriate elements for the production for the task.	Selects some useful elements for the production for the task.	Transcribes data contained in the message to be interpreted	Identifies elements without regard for their pertinence.
	Information decoding	Exactly interprets the information contained in the sources.	Decodes the essential information contained in the sources.	Decodes the data contained in the sources.		
	Citation and credibility of information sources	Identifies and uses pertinent sources of information and upon request, justifies their credibility based on valid criteria.	Identifies and uses credible sources of information.	Uses sources of information whose credibility may vary. Cites certain sources of information consulted.	Limits himself to a single source among those suggested. Uses sources of information whose credibility is doubtful.	Does not identify the sources consulted. Is satisfied with previous knowledge as his sole source of information.
Adequate production of messages of a scientific or technological character.	Organisation of message		Correctly organises the elements of his poster or slide show.	Partially organises the elements of his poster or slide show.	Produces his poster or slide show by juxtaposing elements and without adapting it to his audience.	Presents a limited number of elements, which makes understanding his poster or slide show difficult.
	Adaptation of message	Popularises his poster or slide show for ease of comprehension and interpretation.	Adapts his poster or slide show to his audience.  Clearly transmits his poster or slide show.  Produces his poster or slide show that always respects intellectual property.	Partially adapts his poster or slide show.		
Respect for terminology, rules and conventions particular to science and technology in the production of messages.	Respect for rules and conventions	Uses terminology that goes beyond that required by the task, while respecting the rules and conventions for his poster or slide show.	Resorts to terminology that conforms to usual rules and conventions.	For the simplest concepts uses terminology that respects the rules and conventions.	Uses elementary vocabulary or modes of representation that do not much respect the rules and conventions.	Uses everyday vocabulary or modes or representation without regard for rules or conventions.
	Use of communication tools	Chooses efficient modes of representation.	Uses appropriate modes of representation that use, as needed, information and communication technology to present the data in the form of tables, graphs or sketches.	Chooses acceptable modes of representation to present his data.	Chooses somewhat inappropriate tools to present the data in the form of tables, graphs or sketches.	Chooses inappropriate tools to present data in the form of tables, graphs or sketches.