# Environmentally Sustainable Analysis

# Vol.14

## Final Exam!

- ✓ There is no explanatory video for Lesson 14.
- ✓ The exam questions are listed on the following slides. Please answer them using Google Form.
- ✓ Answers for the final exam will be distributed by TEAMS until Jan.31th.

Thank you for your corporation!

Final Exam: Q1 – Q11

- Answer sheet:

https://forms.gle/BWu1Wzgva4VooSLYA

- Deadline of the Answer Submission:

*Jan. 24th Wednesday*

## Q1

Which of the following is not included in the LCA phase in ISO14040:2006?

A) Setting the purpose and scope of the investigation
B) Inventory analysis
C) Environmental Impact Assessment
D) Interpretation
E) Critical review

## Q2

Which of the following best describes system boundaries?

A) The boundaries of the unit process related to each material and energy
B) The boundary of the foreground data collection in the product system from raw material extraction to final disposal
C) The boundary between the unit process and the environment
D) The boundaries between product systems and the environment or other product systems

## Q3

Which of the following statements is incorrect?

A) Comparative assertions intended for public disclosure must have the common functional units.
B) Environmental impact weighting is prohibited in comparative assertions intended for public disclosure.
C) Only inventory analysis results shall be used in comparative assertions intended for public disclosure.
D) Comparative assertions intended for public disclosure must undergo a critical review involving interested parties.

## Q4

A factory uses 400 pieces of part A and 200 kg of material B to make 100 pieces of product P per day.
Using the information below, select from (A) to (E) the one that most closely matches the amount of CO2 emissions per unit of product P.

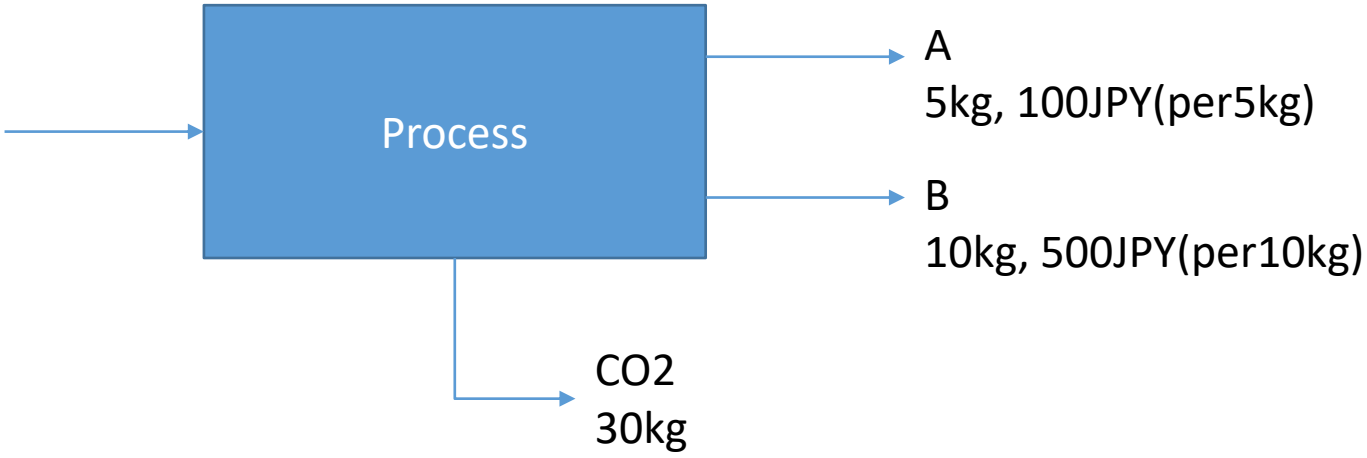
[Information]

・10 kg of polypropylene and 20 kWh of electricity are required to manufacture one part A.
・The amount of CO2 emissions to produce 1 kg of polypropylene (upstream processes have been added up) is 0.60 kg.
・CO2 emissions per 1 kWh of electricity (upstream process totaled) is 0.40 kg.
・The amount of CO2 emissions (including upstream processes) to produce 1 kg of material B is 5 kg.

A) 10kg
B) 24kg
C) 56kg
D) 66kg
E) 76kg

## Q5

Allocation based on weight was performed to obtain the CO2 emissions when producing 1 kg of product A and product B in the following unit process.
Which of the following is the correct result?




A) A is twice as large
B) B is twice as large
C) A is five times larger
D) B is 5 times larger
E) A and B are the same

## Q6

There is a process that uses 40 kg of polypropylene and 2 kWh of electricity to produce 30 kg of plastic product A and 10 kg of plastic product B.
Select the correct answer from the following to find out how much CO2 will be emitted to produce 1 kg of product A when distributed based on the weight of the produced product.

[Information]
Assume that the CO2 emissions for producing 1 kg of polypropylene (upstream process totaled) is 0.60 kg, and the CO2 emissions for 1 kWh of electricity (upstream process totaled) is 0.40 kg/kWh.

A) 0.062kg-CO2
B) 0.082kg-CO2
C) 0.62kg-CO2
D) 0.80kg-CO2
E) 0.82 kg-CO2

## Q7

Select the correct description of the characterization factors used when assessing each environmental impact category (impact category) in a Life Cycle Assessment (LCA).

A) The characterization factor is generally an estimate of the actual damage.
B) Characterization factors are typically numbers that indicate the potential impact on the impact category.
C) The characterization factor is generally a numerical value that converts the damage into an economic value.
D) Characterization factors generally use weighting factors determined by the stakeholders themself.
E) Characterization factors are generally determined as a national target values.

## Q8

The following table shows the inventory analysis results for the life cycle of one glass bottle.
Which of the following is the closest when calculating the impact on global warming in terms of CO2 equivalents?
[Information]
1kg of CH4 is 25kg-CO2eq, and N2O is 300kg-CO2eq.

Table. Inventory analysis results for the life cycle of one glass bottle

| Substances | Emission |
|---|---|
| CO2 | 20 kg |
| CH4 | 0.02 kg |
| N2O | 0.003 kg |

A) 3.40kg-CO2eq
B) 21.4kg-CO2eq
C) 25.9kg-CO2eq
D) 29.5kg-CO2eq
E) 34.0kg-CO2eq

# Q9

The following table shows the inventory analysis results for the life cycle of one glass bottle.
Which of the following is the closest when calculating the impact on global warming in terms of CO2 equivalents?
[Information]
1kg of CH4 is 25kg-CO2eq, N2O is 300kg-CO2eq, CFC-11 is 5,000kg-CO2eq, HCFC-22 is 10,000kg-CO2eq.

Table. Inventory analysis results for the life cycle of one glass bottle

| Substances | Emission |
|---|---|
| CO2 | 2 kg |
| CH4 | 0.2 kg |
| N2O | 0.02 kg |
| CFC-11 | 0.0002 kg |
| HCFC-22 | 0.0002 kg |

A) CO2 has the largest contribution
B) CH4 has the largest contribution
C) N2O has the largest contribution
D) CFC-11 has the largest contribution
E) HCFC-22 has the largest contribution

## Q10

Which of the following statements is correct?

A) Carbon footprint is the CO2 emissions in the life cycle of the target product.
B) In most cases, the ratio of each component to the carbon footprint calculation will be the same as for the water footprint.
C) Since the carbon footprint aims to reduce the greenhouse gas emissions of the manufacturing process, ISO shows the methodology to calculate greenhouse gas emissions from the extraction of resources to the manufacturing product.
D) Carbon Footprint aims to reduce greenhouse gas emissions from manufacturing processes, so greenhouse gas emissions such as electricity that cannot be reduced by the efforts of product manufacturers are not included in the calculation.
E) Carbon Footprint calculations are based on pre-defined Product Category Rules (PCR).

## Q11

In the Organizational Scope 3 Standard jointly issued by WRI(World Resource Institute) and WBCSD(World Business Council for Sustainable Development), the scope of greenhouse gas accounting for organizations such as companies is divided into Scope 1, Scope 2, and Scope 3.
Which of the following descriptions is correct?

A) Scope 1 refers to energy-induced upstream greenhouse gas emissions, such as greenhouse gas emissions at power plants when using electricity within an organization.
B) Scope 2 refers to emissions of greenhouse gases within the organization, such as combustion of heavy oil.
C) Scope 3 refers to greenhouse gas emissions directly related to product production, such as the purchase of materials necessary for product production and the use of produced products. Employee commuting and business trips are not included.
D) Scope 3 is planned to be calculated by measuring physical quantities, not by economic balance.
E) Scope 3 is classified into 15 categories upstream and downstream of the organization. This includes employee commuting.

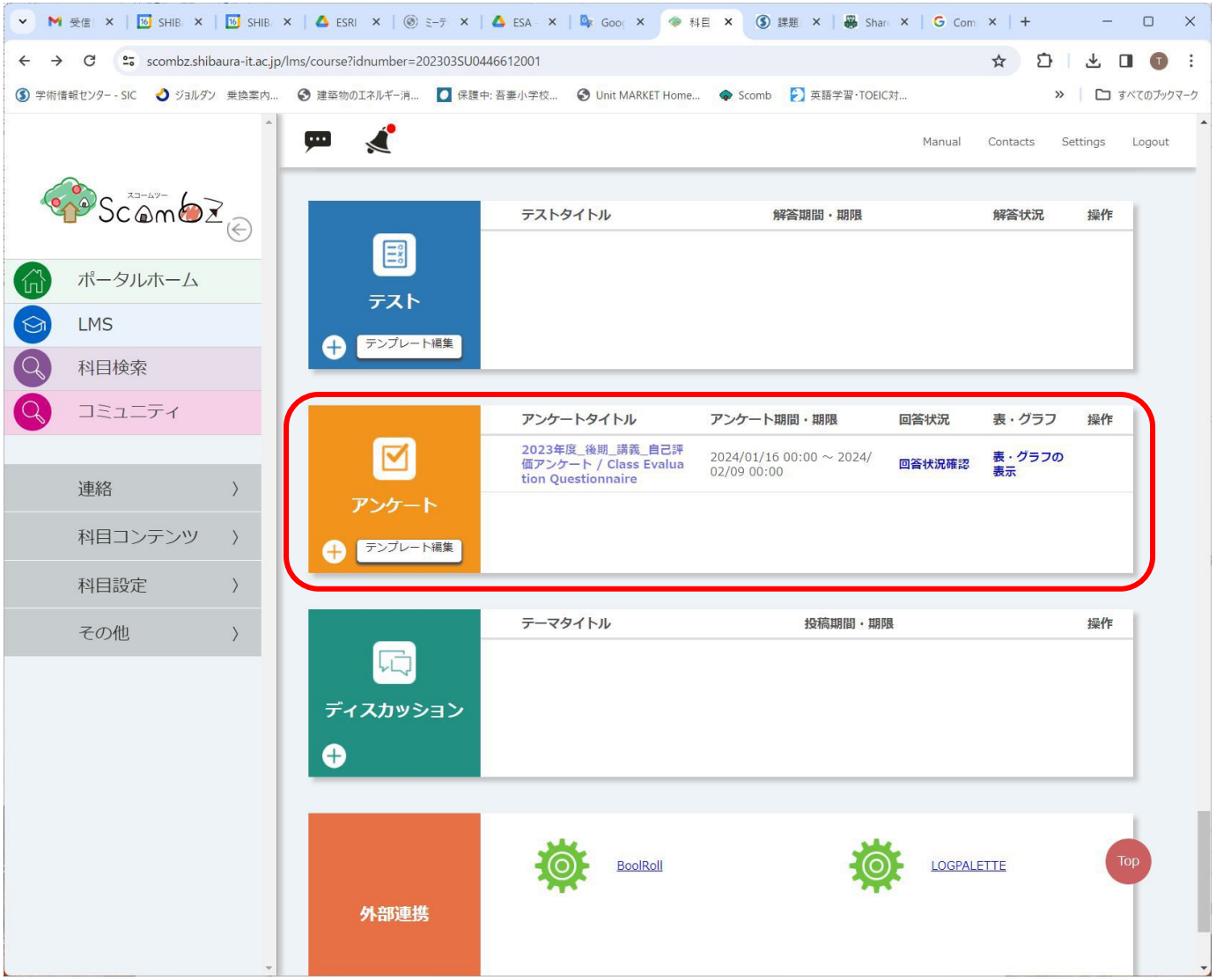
# *Final Report*

"How LCA will help your future research?"

How do you expect your future research and its findings to contribute to reducing environmental impacts?
Also, how LCA will help the further reduction of environmental impact?
Write a report of at least one page in A4 size and submit it in PDF file format.

*Submission place: TEAMS>Assignment> Final Report*
*Deadline: Jan. 24th Wednesday*

# ➢ Self-evaluation Questionnaire (released by SIT student office)




Please evaluate this class for the better lecture!

# We are waiting for you at IWATA lab!

https://www.paes.shibaura-it.ac.jp/en/introduction/labo/10/

https://www.paes.shibaura-it.ac.jp/t-iwata/