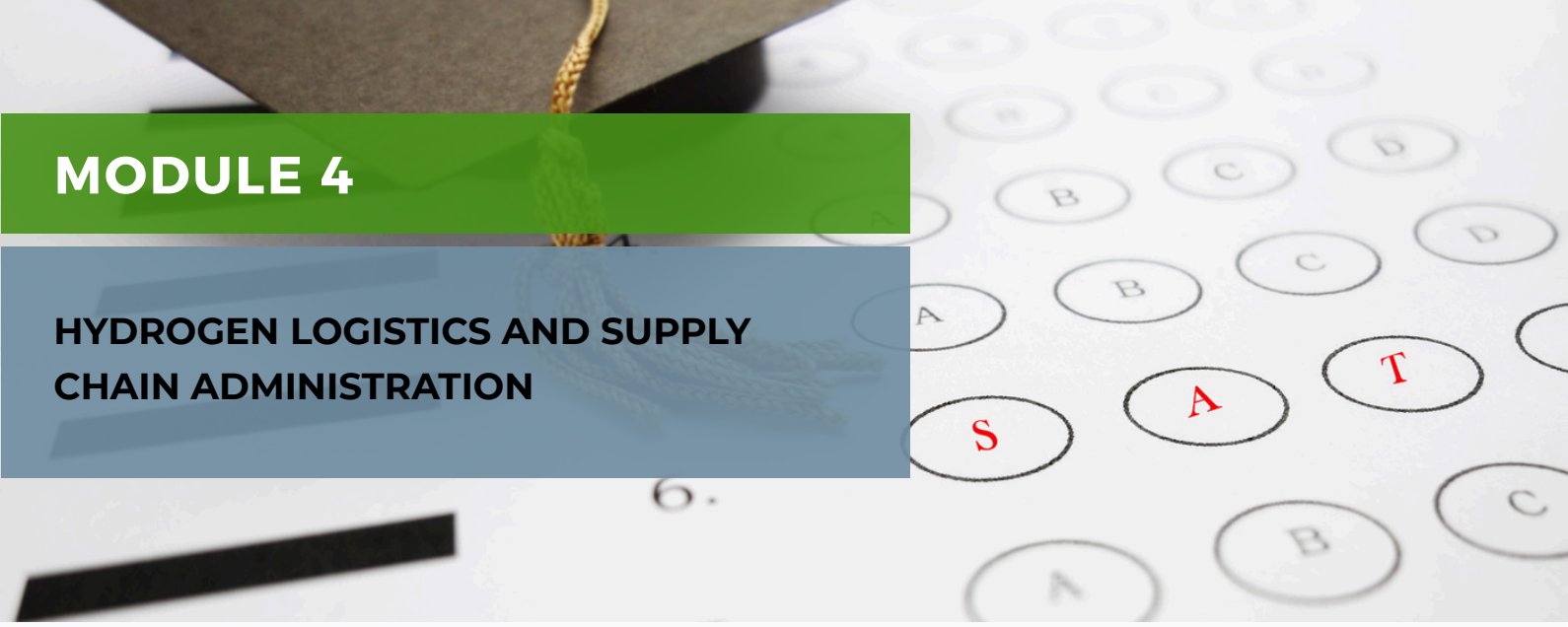

MODULE 4

HYDROGEN LOGISTICS AND SUPPLY CHAIN ADMINISTRATION

Knowledge Assessment for Module 4

Select one accurate response for each question.

Question 1: What is the primary objective of the Hydrogen Logistics and Supply Chain Management module?

A. Solely an introduction to advanced technologies for hydrogen production.
B. Concentrate on the historical dimensions of traditional fuel logistics.
C. A thorough understanding of existing hydrogen storage technologies and transportation methods, considering technical, safety, and regulatory factors.
D. Preparation for the position of a process engineer in refineries.

Question 2: What is the molar mass of hydrogen (H_2) as stated in the Module 2 mini-lecture?

A. Approximately 1.008 g/mol
B. Approximately 4.003 g/mol
C. Approximately 18.015 g/mol
D. Approximately 2.016 g/mol

Question 3: What is the standard pressure range for compressed hydrogen storage in both mobile and stationary applications?

A. From 50 to 100 bars
B. From 100 to 200 bars
C. From 350 to 700 bars
D. Exceeding 1000 bars

Co-funded by the European Union

Question 4: Which category of hydrogen pressure vessel (Type I-IV) is the lightest and most sophisticated, utilizing a polymer insert encased in carbon fiber?

A. Type I
B. Type II
C. Type III
D. Type IV

Question 5: What temperature is necessary to condense hydrogen into liquid form (LH2)?

A. Approximately -183°C
B. Below -253°C
C. Approximately 0°C
D. Approximately -78°C

Question 6: What proportion of the energy present in hydrogen can be captured through the liquefaction process (cryogenics)?

A. Approximately 10-20%
B. Approximately 20-30%
C. Ranging from 30% to 40%
D. Exceeding 50%

Question 7: Which phenomenon entails the gradual evaporation of liquid hydrogen from cryogenic tanks, even in the presence of insulation?

A. Hydrogen Diffusion
B. Boil-off
C. Thermal Creep
D. Phase Transition

Question 8: In what ways does the digital revolution (WMS, TMS, IoT, AI) enhance hydrogen logistics, as discussed in the Module 4 mini-lecture?

A. It merely escalates operational expenses.
B. Results in delays in deliveries.
C. Results in information silos.
D. Streamlines processes, minimizes losses, and enhances safety.

Question 9: Based on the Module 4 mini-lecture, what percentage of hydrogen transport is presently conducted by tanker?

A. Approximately 50%
B. Approximately 70%
C. Approximately 90%
D. Fewer than 20%

Question 10: Which management methodologies, as discussed in the Module 4 mini-lecture, possess significant potential in hydrogen logistics and facilitate genuine process enhancement?

A. Waterfall and Agile
B. Scrum and Kanban
C. Lean Management and Six Sigma
D. PRINCE2 and PMBOK

Question 11: In Worksheet 1 "Introduction to WMS and TMS," WMS refers to a system specifically developed to oversee all operations in:

A. Road transportation.
B. Manufacturing facility.
C. Storage Facility.
D. Pipeline Systems.

Question 12: In Worksheet 2 "Integrating WMS and TMS with IoT and AI," what data can IoT sensors gather during hydrogen transport to enhance TMS?

A. Financial data of drivers.
B. Historical traffic information.
C. Real-time monitoring of pressure, tank temperature, and vehicle location.
D. Consumer preferences.

Question 13: In reference to Worksheet 3 "Hydrogen Storage Management Simulation," what are the two primary criteria for hydrogen tank rotation that a WMS should take into account, in addition to overall space optimization?

A. Color and brand of the tank.
B. Production date and date of the most recent technical inspection.
C. Operator's age and expertise.
D. Distance to the exit gate.

Question 14: In Worksheet 4 "Hydrogen Transport Management Simulation with TMS," which data from IoT sensors in vehicles and tanks is essential for real-time monitoring, as outlined in the instructions?

A. Status of diesel fuel in vehicles.
B. Wind Velocity.
C. Location, tank pressure, temperature.
D. Quantity of water bottles transported.

Question 15: Calculation: In the "Building an Integrated Green Hydrogen Supply Chain" case study, the Logistics Center's initial hydrogen demand is approximately 600 kg per day. How many tons of hydrogen will be required daily once the truck fleet expands to 100 vehicles?

A. 0.6 tons
B. 1.3 tons
C. 2.6 tons
D. 5.0 tons

Question 16: What is the primary strategic objective of the German Government as outlined in its National Hydrogen Strategy, according to the case study?

A. Restricting energy imports.
B. Establishing a global hydrogen market and enhancing national infrastructure.
C. Development of Power-to-Gas technology exclusively.
D. Decrease in employment within the transportation sector.

Question 17: Based on the case study "International Hydrogen Supply for Offshore Wind Farm," what is the weekly surplus production of LH2 in tons that is to be transported from the offshore platform to the mainland?

A. 5 tons
B. 10 tons
C. 20 tons
D. 25 tons

Question 18: Which international standards govern the maritime transport of hazardous materials, including liquefied hydrogen (LH2), as outlined in the case study "International Supply of Hydrogen for an Offshore Wind Farm"?

A. ADR and RID
B. ISO 14687 and IEC 60079
C. IMDG Code and IGC Code
D. Seveso III Directive and ATEX

Question 19: What is the primary concern regarding the storage and transportation of liquid hydrogen (LH2) in extreme marine conditions, as outlined in the case study "International Hydrogen Supply for an Offshore Wind Farm"?

A. Water temperature is insufficient.
B. The phenomenon of "boil-off" – the continuous evaporation of hydrogen.
C. Elevated energy density.
D. No vessels available.

Question 20: What is essential in collaboration with emergency services regarding hydrogen logistics, as discussed in the podcast "Hydrogen in Motion: Storage and Transport of the Future"?

A. Furnishing them with general information regarding the company.
B. Acquainting them with the particulars of hydrogen threats and collaborative exercises.
C. Anticipating that they will independently acquire all the knowledge.
D. Refrain from contact until a significant accident transpires.

Question 21: What is the average CO_2 emission associated with the production of grey hydrogen per kilogram of H_2, as stated in the Module 3 mini-lecture?

A. Approximately 0 kg CO_2
B. Approximately 2-4 kg CO_2
C. Approximately 10 kg CO_2
D. Approximately 15 kg CO_2

Question 22: Which management methodology seeks to minimize defects and variation in processes to nearly zero (targeting 3.4 defects per million opportunities)?

A. Lean Methodology
B. Six Sigma
C. Kanban System
D. Agile Framework

Question 23: Based on the Module 4 mini-lecture, what percentage of global energy demand is projected to be satisfied by hydrogen by 2050, according to the International Energy Agency (IEA)?

A. Approximately 5-10%
B. Approximately 10-20%
C. Approximately 30-40%
D. Exceeding 50%

Question 24: Calculation: If rail transport emits 5 kg of CO_2 per tonne per 100 km, what will be the CO_2 emissions from transporting 20 tonnes of hydrogen over a distance of 400 km, based on the data from Worksheet 2 "Model of an Ecological Logistics System"?

A. 100 kg CO_2
B. 200 kg CO_2
C. 300 kg CO_2
D. 400 kg CO_2

Question 25. What is the primary responsibility of a hydrogen storage and transport logistics specialist, as discussed in the podcast "Hydrogen Logistics – Key Competencies and the Future of the Profession"?

A. Exclusively operating hydrogen vehicles.
B. Design of Wind Turbines.
C. Designing, implementing, and optimizing the comprehensive hydrogen supply chain.
D. Laboratory investigations into the characteristics of hydrogen.

ANSWER KEY

1.C / 2.D / 3.C / 4.D / 5.B / 6.C / 7.B / 8.D / 9.C / 10.C / 11.C / 12.C / 13.B / 14.C / 15.C
16.B / 17.C / 18.C / 19.B / 20.B / 21.C / 22.B / 23.B / 24.D / 25.C /

Funded by the European Union. The views and opinions expressed are exclusively those of the author(s) and do not necessarily represent the views and opinions of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor the EACEA bears any responsibility for them.