NANOWARE Curriculum

MODULE 6: APPLICATIONS OF NANOTECHNOLOGY ASSESSMENT

DELIVERABLE: R1/T1.1



31.10.2022

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Project Number: 2021-2-PL01-KA220-SCH-000051200



Co-funded by the European Union

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Contents

1.	A	ssessment	3
	1.1	Knowledge Assessment	3
	1.2	Skills Assessment	7







Assessment

The following sections aim to support you in the self-reflection process of your knowledge and skills. Answer the questions wisely based on what you have learned. Tips and feedback will be provided to motivate you learn more about the topic!

1.1 Knowledge Assessment

This part includes quiz-like questions for you to reflect on your knowledge!

Take your time to answer the ten (10) following questions!

Question 6.1(multiple choice or true/false):

Nanomaterials have:

[Same properties as materials at larger scales]

[Unique properties]

[Unchartered behaviour]

[generic feedback]: Learners appreciate the unique properties of matter at the nanoscale.

Question 6.2 (multiple choice or true/false):

In electronic engineering, nanotechnology:

[Can be used to develop faster and portable systems]

[Can be used to develop everlasting systems]

[Cannot be used]

[generic feedback]: Learners understand the potential of nanotechnology in various industries.





Question 6.3 (multiple choice or true/false):

In medicine, research at the nanoscale has improved our understanding of:

[Molecular behavior and function]

[Brain function]

[Death]

[generic feedback]: Learners understand the potential of nanotechnology in various industries.

Question 6.4 (multiple answers correct):

Nanomaterials are synthesized using the following approach:

[Top-down]

[Bottom-up]

[Linear]

[Circular]

[generic feedback]: Learners appreciate the differences in nanomaterials' synthesis.

Question 6.5 (multiple answers correct):

Environmental science can use nanotechnology to:

[Develop alternative energy sources]

[End pollution]

[Stop the climate crisis]

[Improve water quality]

[generic feedback]: Learners are now familiar with different nanotechnology applications.





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Question 6.6 (multiple answers correct): In clothing, embedded nanoparticles can: [Lower prices] [Make no difference] [Make fabric water-repellent] [Make fabric stain-resistant]

Question 6.7 (multiple answers correct):

In the food industry, nanotechnology can:

[Develop foods that cure cancer]

[Make no difference

[Improve texture and flavour]

[Be used to improve packaging/food safety]

[generic feedback]: Learners appreciate the different ways in which nanotechnology can improve consumer products.

Question 6.8 (matching):

Match the terms with their definitions.

Nanomanufacturing: Synthesizing nanomaterials.

Top-down approach: Manipulating bulk materials to create fine particles in nano dimensions.

Bottom-up approach: Assembling fine particles to create nanomaterials through self-assembly or co-precipitation methods.

Nano-oncology: Oncology using nanotechnology to improve the efficacy of traditional chemotherapy drugs and increase response rates.

DNA nanotechnology: The technology used to control molecular self-assembly.





[generic feedback]: Learners understand the vast potential of applications of nanotechnology.

Question 6.9 (matching):

Match the concepts with their explanations.

Nanomaterials: A new class of atomically engineered materials with unique properties at the nanoscale.

Nanopharmaceuticals: Revolutionary pharmaceuticals developed by nanobiotechnology to utilize nanoparticles' unique properties and functions.

Nanobiotechnology: The technology that ensures optimal drug delivery, targeted cancer treatment, antimicrobial activity, tissue regeneration, nerve protection, etc.

Drug targeting in nano-oncology: The process of nano-engineered drugs that directly target tumour sites without damaging healthy tissue.

Nano engineering tools: Matter utilized at the nanoscale to reach nanotechnology goals.

[generic feedback]: Learners understand the vast potential of applications of nanotechnology.

Question 6.10 (matching):

Match the problems with their solutions.

I want to create fine particles in nano dimensions using bulk materials: Use the top-down approach.

I want to assemble fine particles to create nanomaterials: Use the bottom-up approach.

I want to treat a cancer patient without damaging healthy tissue: Use nanopharmaceuticals and drug targeting.

My packaging company seeks ways to preserve food for longer periods of time: Consider embedding nanoparticles in your packaging solutions.

[generic feedback]: Learners understand the vast potential of applications of nanotechnology





1.2 Skills Assessment

This is the part where your knowledge is being put into action!

Train your brain with the skills you gained through this module and think through a possible answer to the following assignment!

Why do you think that nanotechnology can develop water-repellent fabric?

Answer: At the nanoscale, matter behaves very different than at other scales: the physical and chemical properties of nanoparticles are significantly different than the properties of materials at larger scales. Depending on shape, size, surface characteristics and inner structure, nanoparticles can change properties when met with certain chemicals and can have **attractive or repulsive interactions** between them that will either group or separate them.

