

TECHNICAL ENGLISH AND TERMINOLOGY

For 1st year Master students

(Chemical engineering, Environmental engineering & Industrial hygiene/safety)



2024/2025

UNIT 01:

Reading comprehension and vocabulary

# **Interdisciplinary Collaboration in Water and Wastewater Treatment**

Water and wastewater treatment are indeed vital processes in our society, playing a key role in ensuring the safety of our water for various uses and the proper treatment of wastewater before it’s returned to the environment. These complex processes involve several steps, each designed to remove different types of contaminants from the water, with the ultimate goal of producing clean water that meets specific quality standards for its intended use.

These processes require the expertise of professionals from various disciplines, including chemical engineering, environmental engineering, and industrial hygiene and safety. Each field plays a crucial role in the water and wastewater treatment process.

Chemical engineers often design and optimize these treatment processes, focusing on the chemical reactions involved in removing pollutants. They also play a key role in the selection and application of chemicals used in the treatment process, the design of reactors, and the development of process control strategies. However, these processes can sometimes produce toxic byproducts.

This is where environmental engineers play a crucial role. They are tasked with identifying sustainable and affordable approaches to handle these byproducts. For instance, they may innovate novel techniques to break down these hazardous substances or convert them into less harmful materials. Additionally, environmental engineers strive to fulfill their responsibilities effectively while ensuring environmental compliance.

Meanwhile, professionals in industrial hygiene and safety play a critical role in ensuring the safety of these processes. They conduct risk assessments to identify and evaluate the potential hazards associated with the treatment processes, such as exposure to chemicals, biological agents, or physical factors. They implement safety protocols to prevent or minimize these hazards. They monitor the performance of the treatment processes and the quality of the treated water and effluent, and report any deviations or incidents that might affect the safety of workers or the environment.

In conclusion, water and wastewater treatment processes are complex and require the expertise of professionals from different fields. By working together, they can ensure that our water resources are managed effectively and safely. They can develop innovative solutions to treat water and wastewater, addressing hazardous issues through sustainable methods, and ensure the safety of workers and the environment. This interdisciplinary collaboration is key to addressing the water challenges we face today and in the future. It’s a testament to the power of teamwork and the importance of understanding and respecting the roles and contributions of different fields in achieving a common goal. This synergy not only ensures the safety and sustainability of our water resources but also highlights the interconnectedness of our actions and their impact on the world around us.

**Vocabulary Table**

|  |  |  |  |
| --- | --- | --- | --- |
| Field | English | French | Arabic |
| Chemical &Environmental Engineering | Chemical reactions | Réactions chimiques | تفاعلات كيميائية |
| Contaminants | Contaminants | ملوثات |
| Toxic byproducts | Sous-produits toxiques | منتجات سامة جانبية |
| Reactors | Réacteurs | مفاعلات |
| Process control strategies | Stratégies de contrôle des processus | استراتيجيات مراقبة العمليات |
| Eco-friendly solutions | Solutions respectueuses de l'environnement | حلول صديقة للبيئة |
| Cost-effective solutions | Solutions rentables | حلول فعالة من حيث التكلفة |
| Impact of the treatment process on the environment | Impact du processus de traitement sur l'environnement | تأثير عملية العلاج على البيئة |
| Recycling  | Recyclage  | إعادة التدوير  |
| Reduction of greenhouse gas emissions | Réduction des émissions de gaz à effet de serre | تقليل انبعاثات الغازات الدفيئة |
|  | Sludge | Boue | وحل |
|  | Wastewater | Eaux usées | مياه الصرف الصحي |
| Industrial Hygiene and Safety | Risk assessments | Évaluations des risques | تقييم المخاطر |
| Potential hazards | Dangers potentiels | مخاطر محتملة |
| Exposure to chemicals | Exposition aux produits chimiques | تعرض للمواد الكيميائية |
| Biological agents | Agents biologiques | عوامل حيوية |
| Physical factors | Facteurs physiques | عوامل فيزيائية |
| Safety protocols | Protocoles de sécurité | بروتوكولات السلامة |
| Personal protective equipment (PPE) | Équipement de protection individuelle | معدات الحماية الشخصية |
| Compliance with regulations | Conformité aux réglementations | الامتثال للتنظيمات |
| Performance monitoring | Suivi des performances | مراقبة الأداء |
| Quality monitoring | Suivi de la qualité | مراقبة الجودة |
| Incident reporting | Signalement d'incidents | الإبلاغ عن الحوادث |

**A) Comprehension**

1. ***General Vocabulary***

Find the words in the reading which fit the definitions below:

* The process of making water suitable for a specific purpose, such as drinking or irrigation. (Hint: It starts with T and ends with T)
* The process of transforming one substance into another by changing its chemical composition. (Hint: It starts with R and ends with N)
* The process of choosing and using chemicals for a specific purpose, such as cleaning or disinfecting. (Hint: It starts with A and ends with N)
* The process of monitoring and adjusting the operation of a system or a device, such as a reactor or a pump. (Hint: It starts with C and ends with L)
1. ***Specific Vocabulary***

Match the words with their synonyms:

|  |  |
| --- | --- |
| 1. pollutants | a. dangerous |
| 2. sustainable | b. experts |
| 3. hazardous | c. characteristics |
| 4. professionals | d. impurities |
| 5. properties | e. eco-friendly |

**III - Understanding the Passage**

**1)- Multiple Choice Questions:**

1. What is the ultimate goal of water and wastewater treatment processes?

a. To produce toxic byproducts

b. To produce clean water that meets specific quality standards

c. To produce effluent

2. Who is responsible for designing and optimizing the treatment processes?

a. Environmental engineers

b. Industrial hygiene and safety professionals

c. Chemical engineers

3. Who conducts risk assessments to identify potential hazards associated with the treatment processes?

a. Chemical engineers

b. Environmental engineers

c. Industrial hygiene and safety professionals

4. What is the role of environmental engineers in the water and wastewater treatment process?

a. They conduct risk assessments to identify potential hazards.

b. They design and optimize treatment processes, focusing on the chemical reactions involved in removing pollutants.

c. They ensure compliance with environmental and safety regulations.

**2)- True or False Questions:**

1. Chemical engineers focus on the chemical reactions involved in removing contaminants. (True/False)
2. Environmental engineers work on finding eco-friendly and cost-effective solutions to manage toxic byproducts. (True/False)
3. The text does not mention that the synergy ensures the safety and sustainability of our water resources. (True/False)
4. Chemical engineers do not play a key role in the selection and application of chemicals used in the treatment process. (True/False)
5. Industrial hygiene and safety professionals implement safety protocols to prevent or minimize hazards. (True/False)
6. The water and wastewater treatment processes do not require the expertise of professionals from different fields. (True/False)
7. The power of teamwork and the importance of understanding and respecting the roles and contributions of different fields in achieving a common goal is not highlighted in the text. (True/False)

***3)- Contextual Reference***

Answer the following questions about the referents in this paragraph.

Water and wastewater treatment are complex processes. (1) **They** involve multiple steps to remove contaminants. (2) The processes aim to produce clean water. (3) **This** water must meet quality standards for its intended use. (4) Chemical engineers often design and optimize the treatment processes. (5) **They** focus on the chemical reactions for removing pollutants. (6) Environmental engineers identify sustainable approaches. (7) **These** approaches address toxic byproducts from the processes. (8) Meanwhile, industrial hygiene and safety professionals conduct risk assessments. (9) **They** also implement safety protocols. (10) **These** prevent or minimize the hazards.(11)

a. In sentence (2), They refers to ...

b. In sentence (4), This water refers to ...

c. In sentence (6), They refers to ...

d. In sentence (8), These approaches refers to ...

e. In sentence (10), They refers to ...

f. In sentence (11), These refers to ...

***Translation and definitions***

1. Arabic translation

**التعاون متعدد التخصصات في معالجة المياه ومياه الصرف الصحي**

تعتبر معالجة المياه ومياه الصرف الصحي بالفعل عمليات حيوية في مجتمعنا ، حيث تلعب دورا رئيسيا في ضمان سلامة مياهنا للاستخدامات المختلفة والمعالجة المناسبة لمياه الصرف الصحي قبل إعادتها إلى البيئة. تتضمن هذه العمليات المعقدة عدة خطوات ، كل منها مصمم لإزالة أنواع مختلفة من الملوثات من الماء ، بهدف نهائي هو إنتاج مياه نظيفة تلبي معايير الجودة المحددة للاستخدام المقصود.

تتطلب هذه العمليات خبرة محترفين من مختلف التخصصات ، بما في ذلك الهندسة الكيميائية والهندسة البيئية والنظافة والسلامة الصناعية. يلعب كل حقل دورا حاسما في عملية معالجة المياه والصرف الصحي.

غالبا ما يقوم المهندسون الكيميائيون بتصميم وتحسين عمليات المعالجة هذه ، مع التركيز على التفاعلات الكيميائية التي تنطوي عليها إزالة الملوثات. كما أنها تلعب دورا رئيسيا في اختيار وتطبيق المواد الكيميائية المستخدمة في عملية المعالجة ، وتصميم المفاعلات ، وتطوير استراتيجيات التحكم في العمليات. ومع ذلك ، يمكن أن تنتج هذه العمليات في بعض الأحيان منتجات ثانوية سامة.

هذا هو المكان الذي يلعب فيه مهندسو البيئة دورا حاسما. هم مكلفون بتحديد مناهج مستدامة وبأسعار معقولة للتعامل مع هذه المنتجات الثانوية. على سبيل المثال ، قد يبتكرون تقنيات جديدة لتفكيك هذه المواد الخطرة أو تحويلها إلى مواد أقل ضررا. بالإضافة إلى ذلك ، يسعى مهندسو البيئة إلى الوفاء بمسؤولياتهم بشكل فعال مع ضمان الامتثال البيئي.

وفي الوقت نفسه ، يلعب المتخصصون في النظافة والسلامة الصناعية دورا مهما في ضمان سلامة هذه العمليات. يقومون بإجراء تقييمات للمخاطر لتحديد وتقييم المخاطر المحتملة المرتبطة بعمليات المعالجة ، مثل التعرض للمواد الكيميائية أو العوامل البيولوجية أو العوامل الفيزيائية. أنها تنفذ بروتوكولات السلامة لمنع أو تقليل هذه المخاطر. ويقومون بمراقبة أداء عمليات المعالجة وجودة المياه المعالجة والنفايات السائلة ، والإبلاغ عن أي انحرافات أو حوادث قد تؤثر على سلامة العمال أو البيئة.

في الختام ، تعتبر عمليات معالجة المياه والصرف الصحي معقدة وتتطلب خبرة محترفين من مختلف المجالات. من خلال العمل معا ، يمكنهم ضمان إدارة مواردنا المائية بشكل فعال وآمن. يمكنهم تطوير حلول مبتكرة لمعالجة المياه ومياه الصرف الصحي ، ومعالجة القضايا الخطرة من خلال أساليب مستدامة ، وضمان سلامة العمال والبيئة. هذا التعاون متعدد التخصصات هو المفتاح لمواجهة هذه التحديات التي نواجهها اليوم وفي المستقبل. إنها شهادة على قوة العمل الجماعي وأهمية فهم واحترام أدوار ومساهمات المجالات المختلفة في تحقيق هدف مشترك. لا يضمن هذا التآزر سلامة واستدامة مواردنا المائية فحسب ، بل يسلط الضوء أيضا على الترابط بين أعمالنا وتأثيرها على العالم من حولنا.

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1. French translation

**Collaboration interdisciplinaire dans le Traitement de l'Eau et des Eaux Usées**

Le traitement de l'eau et des eaux usées est en effet un processus vital dans notre société, jouant un rôle clé pour assurer la sécurité de notre eau pour divers usages et le traitement approprié des eaux usées avant leur retour dans l'environnement. Ces processus complexes comportent plusieurs étapes, chacune conçue pour éliminer différents types de contaminants de l'eau, dans le but ultime de produire une eau propre qui répond à des normes de qualité spécifiques pour l'utilisation prévue.

Ces processus nécessitent l'expertise de professionnels de diverses disciplines, notamment le génie chimique, le génie de l'environnement et l'hygiène et la sécurité industrielles. Chaque champ joue un rôle crucial dans le processus de traitement de l'eau et des eaux usées.

Les ingénieurs chimistes conçoivent et optimisent souvent ces procédés de traitement, en se concentrant sur les réactions chimiques impliquées dans l'élimination des polluants. Ils jouent également un rôle clé dans la sélection et l'application des produits chimiques utilisés dans le processus de traitement, la conception des réacteurs et l'élaboration de stratégies de contrôle des processus. Cependant, ces processus peuvent parfois produire des sous-produits toxiques.

C'est là que les ingénieurs en environnement jouent un rôle crucial. Ils sont chargés d'identifier des approches durables et abordables pour gérer ces sous-produits. Par exemple, ils peuvent innover de nouvelles techniques pour décomposer ces substances dangereuses ou les convertir en matériaux moins nocifs. De plus, les ingénieurs en environnement s'efforcent de s'acquitter efficacement de leurs responsabilités tout en assurant la conformité environnementale.

Pendant ce temps, les professionnels de l'hygiène et de la sécurité industrielles jouent un rôle essentiel pour assurer la sécurité de ces processus. Ils effectuent des évaluations des risques pour identifier et évaluer les dangers potentiels associés aux processus de traitement, tels que l'exposition à des produits chimiques, des agents biologiques ou des facteurs physiques. Ils mettent en œuvre des protocoles de sécurité pour prévenir ou minimiser ces dangers. Ils surveillent la performance des procédés de traitement et la qualité de l'eau et des effluents traités, et signalent tout écart ou incident susceptible d'affecter la sécurité des travailleurs ou l'environnement.

En conclusion, les processus de traitement de l'eau et des eaux usées sont complexes et nécessitent l'expertise de professionnels de différents domaines. En travaillant ensemble, ils peuvent s'assurer que nos ressources en eau sont gérées efficacement et en toute sécurité. Ils peuvent développer des solutions innovantes pour traiter l'eau et les eaux usées, résoudre les problèmes dangereux grâce à des méthodes durables et assurer la sécurité des travailleurs et de l'environnement. Cette collaboration interdisciplinaire est essentielle pour relever les défis auxquels nous sommes confrontés aujourd'hui et à l'avenir. C'est un témoignage de la puissance du travail d'équipe et de l'importance de comprendre et de respecter les rôles et les contributions des différents domaines dans la réalisation d'un objectif commun. Cette synergie garantit non seulement la sécurité et la durabilité de nos ressources en eau, mais met également en évidence l'interdépendance de nos actions et leur impact sur le monde qui nous entoure.

SOLUTION

**A) Comprehension**

1. ***General Vocabulary***

Find the words in the reading which fit the definitions below:

* The process of making water suitable for a specific purpose, such as drinking or irrigation. Treatment
* The process of transforming one substance into another by changing its chemical composition. Reaction
* The process of choosing and using chemicals for a specific purpose, such as cleaning or disinfecting. Application
* The process of monitoring and adjusting the operation of a system or a device, such as a reactor or a pump. Control
1. ***Specific Vocabulary***

Match the words with their synonyms:

|  |  |
| --- | --- |
| 1. pollutants  | a. dangerous |
| 2. sustainable | b. experts |
| 3. hazardous | c. characteristics |
| 4. professionals | d. impurities |
| 5. properties | e. eco-friendly |

**III - Understanding the Passage**

**1)- Multiple Choice Questions:**

1. What is the ultimate goal of water and wastewater treatment processes?

a. To produce toxic byproducts

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c. To produce effluent

2. Who is responsible for designing and optimizing the treatment processes?

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3. Who conducts risk assessments to identify potential hazards associated with the treatment processes?

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b. Environmental engineers

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4. What is the role of environmental engineers in the water and wastewater treatment process?

a. They conduct risk assessments to identify potential hazards.

b. They design and optimize these treatment processes, focusing on the chemical reactions involved in removing pollutants.

c. They ensure compliance with environmental and safety regulations.

**2)- True or False Questions:**

1. Chemical engineers focus on the chemical reactions involved in removing contaminants. (True/False)
2. Environmental engineers work on finding eco-friendly and cost-effective solutions to manage toxic byproducts. (True/False)
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6. The water and wastewater treatment processes do not require the expertise of professionals from different fields. (True/False)
7. The power of teamwork and the importance of understanding and respecting the roles and contributions of different fields in achieving a common goal is not highlighted in the text. (True/False)

***3)- Contextual Reference***

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a. In sentence (2), They refers to complex processes

b. In sentence (4), This water refers to the clean water

c. In sentence (6), They refers to Chemical engineers

d. In sentence (8), These approaches refers to the sustainable approaches

e. In sentence (10), They refers to industrial hygiene and safety professionals

f. In sentence (11), These refers to protocols