

UNIT 6

SOLID WASTE DISPOSAL



1. WARMING UP

1.1. Tick ✓ which of the following words are likely to appear in the text that follows.

- | | | | | | |
|------------|--------------------------|-------------------|--------------------------|------------|--------------------------|
| garbage | <input type="checkbox"/> | wastewater | <input type="checkbox"/> | pesticides | <input type="checkbox"/> |
| sewage | <input type="checkbox"/> | landfills | <input type="checkbox"/> | composting | <input type="checkbox"/> |
| combustion | <input type="checkbox"/> | industrial wastes | <input type="checkbox"/> | fly ash | <input type="checkbox"/> |



2. DEVELOPING LANGUAGE : *Methods*

Solid Waste Disposal is the disposal of normally solid or semisolid materials, which are useless, unwanted, or hazardous and which result from human and animal activities. Solid wastes typically may be *garbage*, *rubbish* (either combustible, such as paper, wood, and cloth, or noncombustible, such as metal, glass, and ceramics), *ashes*, *large wastes*, *dead animals*, *sewage-treatment solids*, *industrial wastes*, *mining wastes* and *agricultural wastes*.

Disposal Methods

The disposal methods of solid wastes include *disposal in landfills*, *incineration* and *composting*. Disposal in landfills is the most common method whereas incineration and composting of solid wastes are less common.

Sanitary landfill is the cheapest means of disposal. In a modern landfill, refuse is spread in thin layers, each of which is compacted by a bulldozer. When about 3 m of refuse has been laid down, a thin layer of clean earth, which also is compacted,



covers it. Pollution of surface and groundwater is minimized by lining and contouring the fill, compacting and planting the cover, selecting proper soil, diverting upland drainage, and placing wastes in sites not subject to flooding or high groundwater levels. Gases are generated in landfills through anaerobic decomposition of organic solid waste. If there is a significant amount of methane, it may be explosive; proper venting eliminates this problem.

In incinerators, refuse is burned on moving grates in refractory-lined chambers; combustible gases and the solids they carry are burned in secondary chambers. Combustion is 85 - 90% complete for the combustible materials. The products of incineration include the normal primary products of combustion—carbon dioxide and water—as well as oxides of sulfur and nitrogen and other gaseous pollutants; nongaseous products are fly ash and unburned solid residue.

Composting of solid wastes include preparing refuse and degrading organic matter by aerobic microorganisms. Refuse is presorted, and is ground up to improve the efficiency of the decomposition process. The refuse is placed in long piles on the

ground or deposited in mechanical systems, where it is degraded biologically to a humus with a total nitrogen, phosphorus, and potassium content of 1 to 3 percent. After about three weeks, the product is ready for curing, blending with additives, bagging, and marketing.

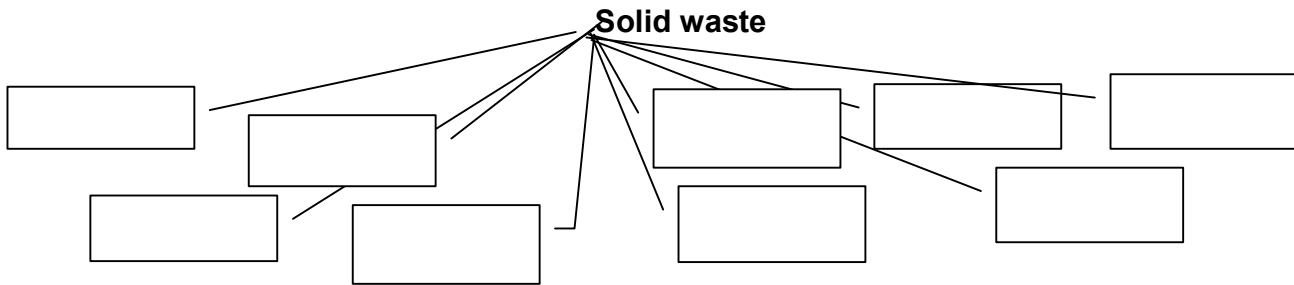


3. UNDERSTANDING LANGUAGE

3.1. Correct the statements.

1. Solid waste disposal means the disposal useless non-toxic materials which result in human and animal activities.
.....
2. Incineration is the most common method of solid waste disposal.
.....
3. Landfills are places where solid waste materials are burnt.
.....
4. Gases are generated in landfills through decomposition of anaerobic solid waste.
.....
5. Methane produced in landfills does not explode if the landfill is lined.
.....
6. In incinerators, combustible gases burn the solids.
.....
7. Composting include preparing solid wastes and degrading aerobic microorganisms.
.....
8. During composting, solid waste is ground up to improve the efficiency of the incineration.
.....

3.2. Fill in the diagram below.



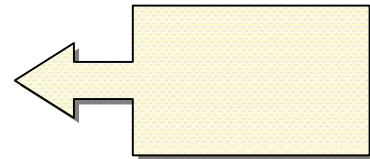
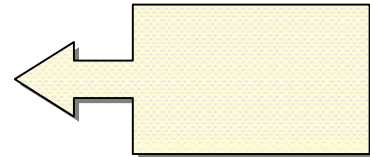
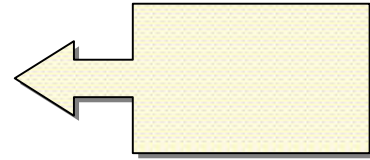
4. PRACTISING LANGUAGE

4.1. Identify the kind of solid waste for the following.

- | | |
|---|--|
| 1. residues of the combustion of solid fuels | |
| 2. slag heaps and coal refuse piles | |
| 3. non-decomposable wastes, either combustible (such as paper, wood and cloth) or noncombustible (such as metal, glass, and ceramics) | |
| 4. decomposable wastes from food | |
| 5. chemicals, paints, and sand | |
| 6. debris from demolition and construction and trees | |
| 7. material retained on sewage-treatment screens, settled solids, biomass sludge | |
| 8. farm animal manure and crop residues | |

4.2. Identify the disposal method.

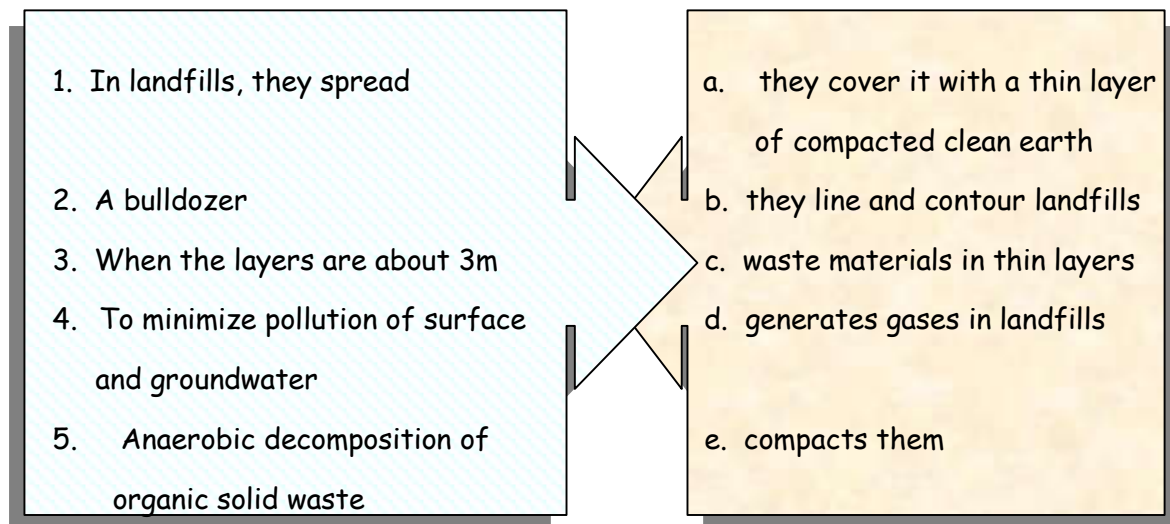
1. wastes are placed in combustion chambers - carbon dioxide and water, oxides of sulfur and nitrogen and other gaseous pollutants are produced
2. wastes are compacted and spread on layers - they are covered with clean compacted earth
3. aerobic microorganisms degrade organic matter - wastes are ground up and placed on the ground or in machinery where they are biologically degraded to a humus.

**4.3. Choose the correct answer.**

1. Solid waste disposal is the disposal of solid ormaterials.
A. non-solid B. semisolid C. sewage
2. The most common method of solid waste disposal is
A. decomposition in landfills B. incineration C. composting
3. In modern landfills, solid wastes are spread in thin.....
A. spreads B. refuse C. layers
4. When solid waste has been spread in the landfill, it is by bulldozers.
A. compacted B. laid down C. covered
5. To minimize water pollution, the landfill is and contoured.
A. lined B. selected C. diverted
6. Gases are in landfills through anaerobic decomposition of organic solid waste.
A. generated B. burnt C. decomposed

7. In incinerators gases and the solids they carry are burned in secondary chambers.
- A. non-combustible B. explosive C. combustible**
8. Carbon dioxide, water and oxides of sulfur and nitrogen are the primary products of
- A. composting B. disposal C. combustion**
9. Composting of solid wastes means preparing waste and organic matter by aerobic microorganisms.
- A. degrading B. compacting C. improving**
10. During composting, waste is ground up to improve the efficiency of the process.
- A. incineration B. presorting C. decomposition**

4.4. Match the information.



5. EXPANDING LANGUAGE

5.1. Match the synonyms in the two columns.

1. refuse	a. compress
2. incineration	b. dangerous
3. sanitary	c. reduce
4. hazardous	d. manure
5. compact	e. decay
6. contour	f. waste
7. decomposition	g. hygienic
8. combustible	h. destroying by burning
9. degrade	i. flammable
10. humus	j. shape, form

1. ... 2. ... 3. ... 4. ... 5. ... 6. ... 7. ... 8. ... 9. ... 10. ...

5.2. Look at the information in the grid below and fill in the sentences that follow making observations and comparing the figures.

COUNTRY	ANNUAL DOMESTIC WASTE (tons)	EQUIVALENT PER PERSON (kilograms)
Australia	10,000,000	680
Belgium	3,082,000	313
Canada	12,600,000	525
Denmark	2,046,000	399
Finland	1,200,000	399
France	15,500,000	288
Great Britain	15,816,000	282
Italy	14,041,000	246
Japan	40,225,000	288
Netherlands	5,400,000	381
New Zealand	1,528,000	488
Norway	1,700,000	415
Spain	8,028,000	214
Sweden	2,500,000	300
Switzerland	2,146,000	336
United States	200,000,000	875
West Germany	20,780,000	337

Microsoft Table

- | | |
|--|-----------------------|
| A. produce the least | G. bigger than |
| B. Japan | H. produces the least |
| C. almost as much waste as | I. is smaller |
| D. that produces the most domestic waste | J. as much as |
| E. West Germany throw away half as much as | K. is bigger |
| F. New Zealand and Norway | |

The United States is the country¹ whereas Finland², with.....³ coming next . The second country in the rank that produces much waste is.....⁴ while people in⁵ Swiss. French throw away⁶ British people every year and Spanish⁷ . In comparison with Belgium, Dutch annual waste production⁸ but in comparison with Italy it⁹. The annual waste per person in Denmark is¹⁰ in Finland although Danish domestic waste production is¹¹ Finnish.

5.2. Derive the nouns from the verbs below.

VERB	NOUN (agent)	NOUN (action)
incinerate		
blend		
contain		_____
select		
generate		
decompose		
eliminate		
refract		
compost	_____	
process		

5.4. Put the sentences in the correct order so that they make up a meaningful paragraph.

- ☐ When they have laid down about 3 m of wastes, they cover it with a thin layer of compacted clean earth.
- ☐ In landfills, they spread waste materials in thin layers and then a bulldozer compacts them .
- ☐ Anaerobic decomposition of organic solid waste generates gases, such as methane, in landfills.
- ☐ To minimize pollution of surface and groundwater they line and contour the fill, they compact and plant the cover, they select proper soil, divert upland drainage, and, finally they place wastes in secure sites.
- ☐ To eliminate the problem of methane explosions they use proper venting.

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**6. STRUCTURAL PRACTICE****6.1. Turn the paragraph in exercise 5.4. into Passive voice.**

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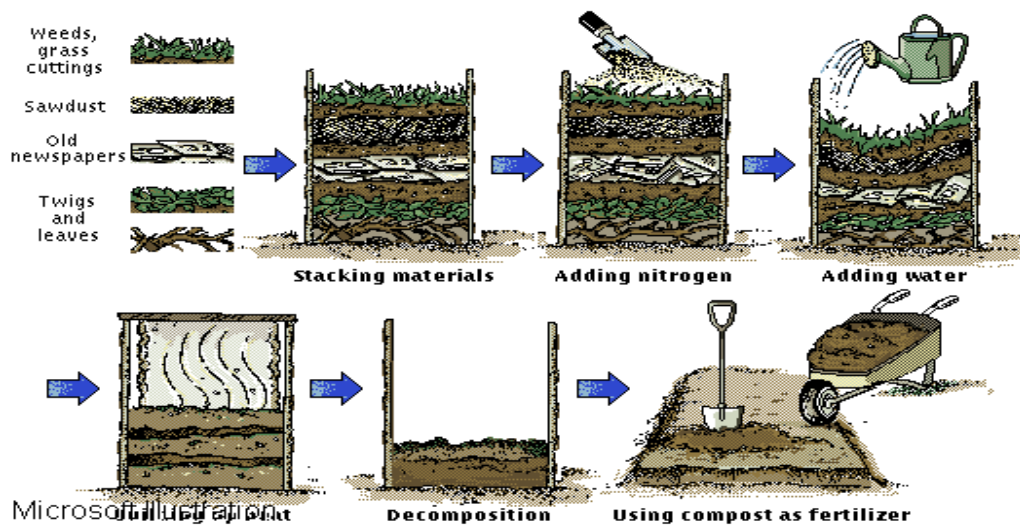
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6.2. Look at the pictures below and fill in the paragraph that follows choosing the appropriate verb from the list given. Use **Passive Voice**.



build	condense	cover	dampen	apply
throw	add	reuse	facilitate	decompose

Composting and Organic Waste

Waste from the garden, yard, and table does not have to¹ away. It may² and³ as a fertilizer through a process called *composting*.

A compost pile⁴ by putting different kinds of waste in a bin. Nitrogen⁵ to the pile in the form of manure, meal, or greenery to generate heat. Rotting⁶ by heat and kills all undesirable organisms. Once the pile⁷ slightly, it⁸ As heat and steam build up, the waste⁹ over time into a nutrient-rich substance called compost. The compost¹⁰ then to plants as a fertilizer.



Glossary

add	προσθέτω/προσθήκη
additives	πρόσθετα
agricultural wastes	γεωργικά απόβλητα
anaerobic	αναερόβιος
annual	ετήσιος
apply	εφαρμόζω
ash/ashes	στάχτη / στάχτες
bagging	ενσάκκιση
bin	κάδος
biomass sludge	ιλύς βιομάζας
blend	μείγμα
blending	ανάμειξη
bulldozer	εκσκαφέας
burn	καίω
chamber	θάλαμος
combustible	εύφλεκτος
combustion	καύση
compact	συμπαγής/συμπιέζω
compost	κομπόστ
composting	κομποστοποίηση
compress	συμπιέζω
condense	συμπυκνώνω
construction	κατασκευή
content	περιεχόμενο
contour	περίγραμμα
contouring	δημιουργία περιγράμματος/διαμόρφωση
contour	διαμορφώνω

cover	κάλυψη/κάλυμμα/επιφάνεια
crops	σπαρτά
curing	επεξεργασία
dampen	βρέχω
debris	θραύσματα
decay	φθορά/παρακμή/αποσύνθεση
decomposition	αποσύνθεση
degrade	υποβαθμίζω
demolition	κατεδάφιση
deposit(n)/(v)	εναπόθεση/εναποθέτω
divert	εκτρέπω
domestic waste	οικιακά απόβλητα
drainage	αποχέτευση
efficiency	αποτελεσματικότητα/αποδοτικότητα
eliminate	εξαλείφω
explode	εκρήγνυμαι
explosion	έκρηξη
explosive	εκρηκτικός
facilitate	διευκολύνω
fertilizer	λίπασμα
fill(landfill)	χωματερή
flammable	εύφλεκτος
flooding	πλημμύρα
fly-ash	ιπτάμενη τέφρα
garbage	απορρίμματα
gaseous	αεριώδης
generate	παράγω
grass cutting	κουρεμένος χλοοτάπητας
grate	σχάρα
greenery	πρασινάδα/βλάστηση

ground up	αλέθω
groundwater	υπόγεια ύδατα
heat	θερμότητα
humus	μαυρόχωμα
hygienic	υγιεινός
in comparison with	σε σύγκριση με
incineration	αποτέφρωση
incinerator	κλίβανος αποτέφρωσης
industrial wastes	βιομηχανικά απόβλητα
lay/laid/laid	στρώνω
layer	στρώμα
leaves	φύλλα
line	γραμμή/ευθυγραμμίζω
manure	κοπριά
marketing	εμπορία/μάρκετινγκ
methane	μεθάνιο
minimize	ελαχιστοποιώ
mining wastes	απόβλητα εξόρυξης
moving grates	κινούμενες σχάρες
nitrogen	άζωτο
non-combustible	μη εύφλεκτος
non-decomposable	μη αποσυνθέσιμος
non-gaseous	μη αέριος
normally	κανονικά/φυσιολογικά
nutrient	θρεπτικός
nutrient-rich substance	ουσία πλούσια σε θρεπτικά συστατικά
pile	σωρός
place	τοποθετώ
plant	φυτό/φυτεύω/εργοστάσιο
potassium	κάλιο

presort	πρώτη διαλογή
primary products	πρωτογενή προϊόντα
process	επεξεργάζομαι/επεξεργασία
proper	κατάλληλος
rank	τάξη/βαθμός/κατάταξη
reduce	μειώνω
refract	διαθλώ
refractory	δυσκολοδούλευτος
refractory-lined chambers	θάλαμοι με εσωτερική πυρίμαχη επένδυση
residue	υπόλειμμα
retain	διατηρώ
rotting	σάπισμα
rubbish	σκουπίδια
sanitary	υγιεινός
sawdust	πριονίδια
secondary	δευτερεύων/δευτερογενής
select	επιλέγω
semisolid	ημιστερεός
settled solids	πάγια στερεά
sewage-treatment screen	οθόνη επεξεργασίας λυμάτων
significant	σημαντικός
site	τοποθεσία
slag heap	σωρός σκωρίας
slightly	ελαφρώς
solid	στερεός
solid fuel	στερεά καύσιμα
solid residue	στερεά υπολείμματα
spread	εξαπλώνω
stack	σωρός/στοιβάζω

steam	ατμός
subject to	υπόκειται σε
sulfur/sulphur	θείο
surface	επιφάνεια
surface water	επιφανειακά ύδατα
total nitrogen	ολικό άζωτο
twig	κλαδάκι
unwanted	ανεπιθύμητος
upland	υψίπεδο/επιφανειακός
useless	άχρηστος
venting	εξαερισμός
weed	αγριόχορτο
yard	αυλή