

UNIT 2

AIR POLLUTION



1. WARMING UP

1.1. Decide which of the following are considered as air pollutants.

acid rain	<input type="checkbox"/>	carbon monoxide (CO)	<input type="checkbox"/>	radon	<input type="checkbox"/>
lead	<input type="checkbox"/>	photochemical oxidants	<input type="checkbox"/>	ozone	<input type="checkbox"/>
carbon dioxide (CO ₂)	<input type="checkbox"/>	sulfur dioxide (SO ₂)	<input type="checkbox"/>	smog	<input type="checkbox"/>



2. DEVELOPING LANGUAGE : Air Pollution

Air Pollution is the contamination of the atmosphere by gaseous, liquid, or solid wastes or by-products that can endanger human health, plants and animals. Air pollution can also attack materials, reduce visibility, or produce undesirable odours. Among air pollutants that are emitted by natural sources, only the radioactive gas *radon* is recognized as a major health threat. Radon, which is a byproduct of the radioactive decay of uranium minerals in some kinds of rock, seeps into the basements of homes built on these rocks.

The most prevalent and widely dispersed air pollutants are carbon monoxide, sulfur dioxide, suspended particles, lead, nitrogen oxides, photochemical oxidants and carbon dioxide. The level of pollution is usually given in terms of *atmospheric concentrations* (micrograms of pollutants per cubic meter of air) or, for gases, in terms of *parts per million*, that is, number of pollutant molecules per million air molecules.

POLLUTANT	MAJOR SOURCES	COMMENTS
Carbon monoxide (CO)	Motor-vehicle exhaust; some industrial processes	Health standard: 10 mg/m ³ (9 ppm) over 8 hr; 40 mg/m ³ over 1 hr (35 ppm)
Sulfur dioxide (SO ₂)	Heat and power generation facilities that use oil or coal containing sulfur; sulfuric acid plants	Health standard: 80 µg/m ³ (0.03 ppm) over a year; 365 µg/m ³ over 24 hr (0.14 ppm)
Suspended particulate matter (TSP)	Motor-vehicle exhaust; industrial processes; refuse incineration; heat and power generation; reaction of pollution gases in the atmosphere	Health standard: 75 µg/m ³ over a year; 260 µg/m ³ over 24 hr; composed of carbon, nitrates, sulfates, and many metals including lead, copper, iron and zinc
Lead (Pb)	Motor-vehicle exhaust; lead smelters; battery plants	Health standard: 1.5 µg/m ³ over 3 months; most of lead contained in TSP
Nitrogen oxides (NO, NO ₂)	Motor-vehicle exhaust; heat and power generation; nitric acid; explosives; fertilizer plants	Health standard: 100 µg/m ³ (0.05 ppm) over a year for NO ₂ ; react with hydrocarbons and sunlight to form photochemical oxidants
Photochemical oxidants (primarily ozone [O ₃]; also peroxyacetyl nitrate [PAN] and aldehydes)	Formed in the atmosphere by reaction of nitrogen oxides, hydrocarbons, and sunlight	Health standard: 235 µg/m ³ (0.12 ppm) over 1 hr
Nonmethane hydrocarbons (includes ethane, ethylene, propane, butanes, pentanes, acetylene)	Motor-vehicle emissions; solvent evaporation; industrial processes; solid waste disposal; fuel combustion	React with nitrogen oxides and sunlight to form photochemical oxidants
Carbon dioxide (CO ₂)	All combustion sources	Possibly injurious to health at concentrations greater than 5000 ppm over 2–8 hr; atmospheric levels have increased from about 280 ppm a century ago to over 350 ppm at present; this trend may be contributing to the greenhouse effect

Microsoft Table

Many air pollutants come from directly identifiable sources; sulfur dioxide, for example, comes from electric power plants burning coal or oil. Others are formed through the action of sunlight on previously emitted reactive materials (called precursors). For example, ozone, a dangerous pollutant in smog, is produced by the interaction of hydrocarbons and nitrogen oxides under the influence of sunlight. Ozone has also caused serious crop damage. On the other hand, the discovery in the 1980s that air pollutants, such as fluorocarbons, are causing a loss of ozone from the earth's protective ozone layer has caused the phasing out of these materials.

Meteorology and Health Effects

Pollutant concentrations are reduced by atmospheric mixing, which depends on such weather conditions as temperature, wind speed, and the movement of high and low pressure systems and their interaction with the local topography, for example, mountains and valleys. Normally, temperature decreases with altitude. But when a colder layer of air settles under a warm layer, producing a temperature or thermal inversion, atmospheric mixing is retarded and pollutants may accumulate near the ground.

Periods of only three days of poor atmospheric mixing can lead to high concentrations of hazardous materials in high-pollution areas and sometimes may result in injury and even death. The effects of long-term exposure to low concentrations are not well defined; however, those most at risk are the very young, the elderly, smokers, workers whose jobs expose them to toxic materials, and persons with heart or lung disease.

Often, the first noticeable effects of pollution may not necessarily be dangerous. These include visibility reduction due to tiny particles suspended in air, or bad odours, such as the rotten egg smell produced by hydrogen sulfide emanating from pulp and paper mills.

Source: "Pollution". Microsoft®; Encarta®; Online Encyclopedia 2004
<http://encarta.msn.com>



3. SCANNING

3.1. Read the text and check which of the statements below are TRUE and which FALSE.

1. Air Pollution is the contamination of the atmosphere by gaseous wastes. ☐
2. Air Pollution can only endanger human health. ☐
3. Radon is an air pollutant emitted by natural sources. ☐
4. All air pollutants come from directly identifiable sources. ☐
5. Ozone is produced by the interaction of hydrocarbons and nitrogen oxides under the influence of sunlight. ☐
6. Atmospheric mixing reduces pollutant concentrates. ☐
7. Poor atmospheric mixing can lead to high pollutant concentrates. ☐
8. Long-term exposure to low concentrations cannot endanger human health. ☐



4. PRACTISING LANGUAGE

4.1. Match the synonyms below.

1. generate
2. dispersed
3. odour
4. phase out
5. altitude
6. retard
7. hazardous
8. emit
9. sustain
10. suspended

- A. send out
- B. height
- C. hold still in liquid or air
- D. dangerous
- E. scattered to different places
- F. stop
- G. smell
- H. produce
- I. cause to happen later
- K. strengthen

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

2. Fill in the missing words choosing from the list given below.

altitude
wastes

threat
pollutants

phasing out
power plants

smog
aesthetic

1. Air Pollution is the contamination of the atmosphere by gaseous, liquid, or solid
2. The radioactive gas radon is recognized as a major health
3. Each year industrially developed countries generate billions of tons of.....
4. Sulfur dioxide comes from electricburning coal or oil.
5. Ozone is a dangerous pollutant in
6. The discovery that air pollutants such as fluorocarbons are causing a loss of ozone from the earth's protective ozone layer has caused the.....

of these materials.

7. Normally, temperature decreases with.....

8. Often, the first noticeable effects of pollution areand may not necessarily be dangerous.



5. EXPANDING LANGUAGE

5.1. Fill in the table below with derivatives of the words given.

	NOUN	ADJECTIVE	ADVERB
expose			
atmosphere			
mix			
concentrate			
gas			
wide			
previous			
invert			
pollute			
visible			
notice			
identify			
reduce			
industrial			
normal			
protect			
contaminate			
lose			

5.2. Fill in the table with the missing prepositions.

result.....	depend.....	lead.....	due.....
expose.....risk	...termsthe other hand



6. PRACTISING STRUCTURES



6.1. Write the following sentence in all tenses of both Active and Passive Voice.

Industrially developed countries/ generate / billions of tons of pollutants

S. PRESENT	
PRESENT CONTINUOUS	
SHALL/WILL FUTURE	
GOING TO FUTURE	
S. PAST	
PAST CONTINUOUS	
PRESENT PERFECT	
PAST PERFECT	
CAN	

**6.2. Choose the correct sentence.**

- 1. The interaction of hydrocarbons and nitrogen oxides produces ozone.**
 - A. Ozone is produced by the interaction of hydrocarbons and nitrogen oxides .*
 - B. Ozone is being produced by the interaction of hydrocarbons and nitrogen oxides .*
 - C. Ozone is producing by the interaction of hydrocarbons and nitrogen oxides .*

- 2. They are building a nuclear plant in the area.**
 - A. A new nuclear plant is being built in the area.*
 - B. A new nuclear plant is built in the area.*
 - C. A new nuclear plant being built in the area.*

- 3. Ozone has caused serious crop damage.**
 - A. Serious crop damage have been caused by ozone.*
 - B. Serious crop damage had been caused by ozone.*
 - C. Serious crop damage has been caused by ozone.*

- 4. The company has used automated systems.**
 - A. Automated systems had been used by the company*
 - B. Automated systems has been used by the company*
 - C. Automated systems have been used by the company*

- 5. The Government will take measures against air pollution.**
 - A. Measures against air pollution will take by the Government .*
 - B. Measures against air pollution will be taken by the Government .*
 - C. Measures against air pollution will taken by the Government .*

**6.3. Turn the sentences from Active to Passive.**

1. He checks air pollution every week.

.....

2. The students are watching an interesting experiment.

.....

3. Someone must service the faulty machine.

.....

4. I am going to repair the computer.

.....

5. The students attended a lecture last week.

.....

6. John was scheduling production.

.....

7. Someone has changed the shifts.

.....

8. He had repaired that machine before.

.....

9. They can't use the tools.

.....

10. He will develop a new network system.

.....



6.4. Below is a short article about computers. Put the verbs in brackets in passive. Choose the correct tense.

COMPUTERS THEN AND NOW

The first electronic computer (build) at the University of Pennsylvania in 1946. Computers (sell) for the first time in the 1950s, and a lot of progress (make) since then. Computers are now smaller and more powerful, and they (can/buy) more cheaply.

Computers (use) in many fields: in business, science, education e.t.c. The computer's memory is the place where information (keep) and calculations (do). Computers (buy) by more and more people all the time. In a few years they (use) by everyone.

USE OF LANGUAGE

Passive Voice



1.1. Η Παθητική φωνή σχηματίζεται με το ρήμα **be** στον κατάλληλο χρόνο και την παθητική μετοχή του κυρίου ρήματος.



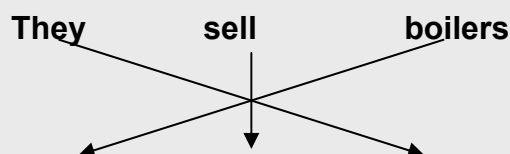
1.2. Για να μετατρέψουμε μια ενεργητική πρόταση σε παθητική:

α) Μετατρέπουμε το **αντικείμενο** της ενεργητικής πρότασης σε **υποκείμενο** της παθητικής.

β) Χρησιμοποιούμε το κύριο ρήμα στην **παθητική μετοχή** και πριν απ' αυτό βάζουμε το ρήμα **be** στο χρόνο που είχε το ρήμα στην ενεργητική πρόταση.

γ) Βάζουμε το **υποκείμενο** της ενεργητικής πρότασης μετά το ρήμα με την πρόθεση **by**.

ACTIVE SENTENCE
here.



PASSIVE SENTENCE:
here.



Boilers are sold by them



1.3. Η Παθητική φωνή χρησιμοποιείται για να δώσει **έμφαση** στην πράξη, και όχι στο υποκείμενο που ενεργεί. Επίσης χρησιμοποιείται όταν δεν ξέρουμε το υποκείμενο ή δε μας ενδιαφέρει ποιος ενεργεί.

π.χ. The building **was destroyed** by fire.



1.4. Οι χρόνοι του ρήματος **to be** είναι:

Simple Present:	am / is / are
Present Continuous:	am / is / are being
Shall/will Future:	shall / will be
Going-to Future:	is / are going to be
Simple Past:	was / were
Past Continuous:	was / were being
Present Perfect:	have / has been
Past Perfect:	had been



1.5. Παραδείγματα Παθητικής με το ρήμα *it / make*

<u>Simple Present:</u>	it is made
<u>Present Continuous:</u>	it is being made
<u>Shall/will Future:</u>	it will be made
<u>Going to Future:</u>	it is going to be made
<u>Simple Past:</u>	it was made
<u>Past Continuous:</u>	it was being made
<u>Present Perfect:</u>	it has been made
<u>Past Perfect:</u>	it had been made



Glossary

accumulate	συσσωρεύω/μαζεύω
adverse	δυσμενής/ενάντιος/αντίθετος
aesthetic	αισθητικός
altitude	ύψος
at risk	σε κίνδυνο
attack	επιτίθεται/επίθεση/προσβάλλω
basement	υπόγειο
burn	καίω/καίγομαι
by-products	υποπροϊόντα
cause	προξενώ/προκαλώ/αιτία
coal	άνθρακας
concentrates	συγκεντρώσεις
concentration	συγκέντρωση
contamination	μόλυνση
couple	ζευγάρι/ενώνω/συνδέω
crop	εσοδεία/καλλιέργεια
decay	παρακμή/φθορά/αποσύνθεση
decrease	μειώνω, -ομαι/ελαττώνω, -ομαι
define	ορίζω/καθορίζω/προσδιορίζω
directly	ευθέως/άμεσα
disperse	(δια)σκορπίζω, -ομαι
effect	ενέργεια/αποτέλεσμα/συνέπεια/ επίδραση/επιρροή
elderly	ηλικιωμένος
emanate	προέρχομαι/απορρέω/εκπηγάζω
emit	εκπέμπω
endanger	διακινδυνεύω/εκθέτω σε κίνδυνο
expose	εκθέτω
exposure	έκθεση
fluorocarbons	φθοράνθρακες
form	σχηματίζω, -ομαι
gaseous	αέριος
hazardous	επικίνδυνος

health	υγεία
human	ανθρώπινος
hydrocarbons	υδρογονάνθρακες
hydrogen sulfide	θειούχο υδρογόνο
identifiable	αναγνωρίσιμος
injury	βλάβη/ζημιά
interaction	αλληλεπίδραση
inversion	αντιστροφή
layer	στρώμα
liquid	υγρό
livestock	κτηνοτροφία
long- term	μακροπρόθεσμος
loss	απώλεια
lung disease	ασθένεια των πνευμόνων
meteorology	μετεωρολογία
mixing	ανάμειξη
molecule	μόριο
mountain	βουνό
natural sources	φυσικές πηγές
necessarily	αναγκαίως
nitrogen oxides	οξειδία του αζώτου
noticeable	αξιοπρόσεκτος/καταφανής/αισθητός
odour	οσμή/μυρωδιά
oil	λάδι/πετρέλαιο
paper mill	εργοστάσιο χαρτοποιίας
particles	μόρια
phasing out	απόσυρση/σταμάτημα
pollutant	ρυπαντής
pollution	ρύπανση
potential	δυνατός/ενδεχόμενος
power plant	εργοστάσιο παραγωγής ηλ. ενέργειας
precursor	
pressure	πίεση
prevalent	επικρατών/κυριαρχών
previously	προηγουμένως

protective	προστατευτικός
pulp mill	εργοστάσιο χαρτοπολτού
radioactive	ραδιενεργός
radon	ραδόνιο
reactive	αντιδραστικός/αντιδρών/ευερέθιστος
reduce	περιορίζω/μειώνω
result in	καταλήγω
retard	επιβραδύνω/καθυστερώ
rotten	σάπιος/χαλασμένος
scatter	διασκορπίζω, -ομαι
seep	διαρρέω/(δια)ποτίζω/περνώ
send out	εκπέμπω/εκβάλλω
settle	εγκαθιστώ/τακτοποιώ
severe	αυστηρός/σοβαρός
smog	αιθαλομίχλη
solid	στερεός
stationary	στάσιμος/ακίνητος/σταθερός/μόνιμος
strengthen	δυναμώνω/ενισχύω
sulfur dioxide	διοξείδιο του θείου
sunlight	ηλιοφώς
suspend	αναρτώ/κρεμώ
sustain	συγκρατώ/στηρίζω/βαστάζω
temperature	θερμοκρασία
threat	απειλή/φοβέρα
tiny	μικροσκοπικός
topography	τοπογραφία
undesirable	ανεπιθύμητος
valley	κοιλάδα
visibility	ορατότητα
wastes	απορρίματα/απόβλητα
weather conditions	καιρικές συνθήκες
welfare	ευημερία