INTRODUCTION TO
TECHNICAL ENGLISH
FOR ENGINEERING 2nd Edition

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EDITORIAL
UNIVERSITAT POLITÈCNICA DE VALÈNCIA

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INTRODUCTION TO TECHNICAL ENGLISH FOR ENGINEERING

OBJECTIVES OF THE COURSE

The objective of this course is to acquaint engineering students with technical and scientific discourse, especially the specific vocabulary and grammatical structures found in texts related to their field of study. Additionally, students will be provided with practice in the four skills necessary to comprehend and express themselves in scientific and technical communicative situations.

RHETORICAL FUNCTIONS

- Definitions
- Description
- Classification
- Comparison and Contrast
- Instructions
- Describing graphs
- Cause and Effect
- Hypothesis
- Sequencing
- Structure and Cohesion
- Expressing opinion
- Expressing degree

GRAMMAR

- Adjectives/Adverbs
- Subject- Verb Agreement
- Articles
- Relative Clauses
- Linking Devices
- Gerunds and Infinitives
- Nouns
- Possessive adjectives
- Quantifiers
- Prepositions
- Pronouns
- Spelling and Punctuation
- Verb Tense
- Types of clauses
- Modal Verbs
- Active and Passive Voice
- Word Formation
- Conditional clauses

LANGUAGE SKILLS

- Reading comprehension and discourse analysis of a variety of scientific and technical texts.
- Oral comprehension of videos and recordings dealing with topics related to engineering.
- Guided written assignments as based on reading and listening exercises.
- Reporting technical information, experiments and processes.
- Translation from Spanish to English and vice versa.

CONTENTS

PART I: MATERIALS

PART II- ENERGY & THE ENVIRONMENT

LIST OF LISTENINGS

PART I

MATERIALS

UNIT 1
MATERIALS

Vocabulary:

- **Names of materials**
- **Characteristics of materials**
- **Adjectives and dimensions**
- **Word formation: adjectives**

Grammar and functions:

- **Articles and possessive adjectives**
- **Describing**
- **Expressing measurement**

NAMES OF MATERIALS

Match these substances with their corresponding descriptions.

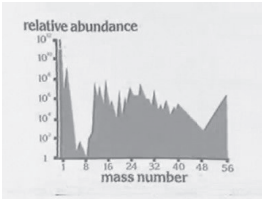
1	Aluminium	**a**	Hard, bluish-white metal used in alloys and in roofing.
2	brass	**b**	Light to carry and silvery to look at.
3	Bronze	**c**	Heavy, white metal whose atoms can be fissioned.
4	carbon dioxide	**d**	Heavy, silvery metal, usually a liquid at room temperature.
5	Chromium	**e**	With symbol Fe, it is the main component of steel.
6	concrete	**f**	Gas produced in the combustion of fossil fuels.
7	copper	**g**	Valuable yellow metal which is a very good conductor.
8	gold	**h**	Iron plus carbon.
9	hydrogen	**i**	A can is made of it and its symbol is Sn.
10	iron	**j**	The lightest gas and the simplest element in nature.
11	lead	**k**	Building material made by mixing cement and gravel.
12	mercury	**l**	Hard, shiny metal used to coat other metals to prevent rust.
13	nitrogen	**m**	80% of the air.
14	oxygen	**n**	Soft, reddish-brown metal, used in wires.
15	tin	**o**	Mixture of copper and tin.
16	uranium	**p**	Mixture of copper and zinc.
17	zinc	**q**	Colourless and tasteless gas supporting life.
18	steel	**r**	Soft, grey, heavy metal used in pipes, whose symbol is Pb

VIDEO:THE ORIGIN OF THE EARTH (Open University)

Complete the outline with the information from the video.

SECTION 1: Elements found in all stars.

A profile of the abundance of elements found in stars shows



- immense amounts of …… and ……

-……amounts (…%) of the heavier elements

The chart illustrates peaks of relative abundance of the following elements

…… ……

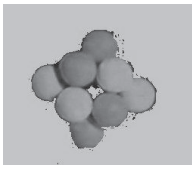
…… ……

…… ……

Process: nuclear fusion

- 2 …… atoms= …… + ……⇨origin of……

  - ……atoms=……
  - ……atoms= ……
  - ……atoms=……



Right up to……

For each of these fusion reactions to occur, …… and …… are needed.

SECTION 2: Samples of meteorites

The Ballwell meteorite fell in 19... in Leicestershire.

Looking at a sample of this meteorite, we can see …… skin due to ……

It consists of ……(……olivine) some……(……) and chondrules.

If we study a thin section of a chondritic meteorite, we find chondrules, …… (……) and …… patches (……)

In the picture, we see the polished surface of iron meteorites: Blades ……

……

To sum up, meteorites contain three principal phases:

…… , ……, ……

Chondritic meteorites appear to have changed chemically *the least* since their condensation from the primitive solar nebula.

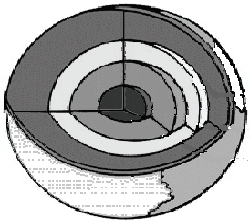
They contain……or……, but otherwise their element abundance should be similar to the (abundance of) heavy elements in the solar spectrum.

SECTION 3: The composition of the Earth

Inner core:……+……

Outer core:……

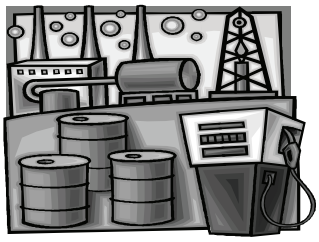
Mantle:……+……



EXERCISE: DESCRIBING

Describe these substances.

Graphite	Ceramics	Nylon	Petrol
Plastics	Silicon	Silver	Glass



LISTENING1: CHARACTERISTICS OF METALS

See QR index U1.1 p.163

The listening talks about the differences between metals and non-metals.

We are so familiar with metals that it might be quite a surprise to be asked the question What is a metal?.

1- Which metal is mentioned first? _____

2- Which is its main characteristic? _____

3- Which other metal is it compared to?_____

4- Which is the main difference between these two metals?_____

The most important properties that distinguish metals from non-metals are:

a- _____

b- _____

c- _____

d- _____

Apart from these similarities, metals show a great deal of variation.

5- Which is the property of gold, lead and sodium? _____

6- They are much softer than which non-metals?_____

7- Which is another typical property of most metals? _____

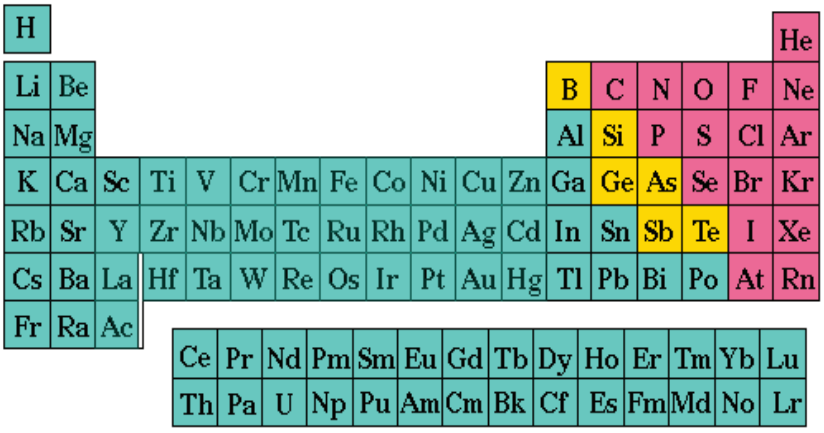
8- However, which metals do not? _____

9- Which metals are very active? _____

10- Which elements do they combine easily with?_____

11- Which metals do not form compounds easily? _____

12- Metals far outnumber non-metals. How many elements are non-metals? _____



DESCRIBING

When describing, you will usually start by giving a definition, i.e. including it in a general class, and then you will mention composition, properties, dimensions and applications.

Definition: X is GENERAL CLASS:			*Lead is a heavy metal.* *A relay is a switching device*.
Composition: It is made (up) of			Materials
It consists of			Substances
It has			Components
It is composed of			Parts
It is formed by			Pieces
Characteristics: To be		+ ADJ	Shape (*circular, elliptical*)
To look		+ ADJ	Properties (*flexible, tough*)
To seem		+ADJ	Colour (*blue, greenish*)
To become		+ ADJ	Texture (*hard, smooth*)
			Temperature (*warm, cold*)
To have +		NOUN	

Dimensions: General dimensions (*thin, long, small*)
Specific dimensions:
X is 3m+ADJ (*long*)
X is 3m+IN+NOUN (*in length*)
X has a +NOUN +OF 3m (´*X has a length of 3m*)
The NOUN+OF X is 3m (*The length of X is 3m*)

Applications: X is used for (+GER) / to (+INF)
X serves to (+INF)
X is used in/as (+NOUN)

Note: The present simple tense is used most frequently when describing, because descriptions in science are usually universals. The most commonly used verbs are TO BE and TO HAVE.

READING: PLASTICS

Plastics(1) are organic materials which can be moulded or *shaped*(2) as *required(3)*. They are *synthetic materials*(4) and *are composed of*(5) *long chain-like molecules*(6) called polymers. Each of these polymer molecules is formed by joining together *many* (7) thousands of small molecules called monomers. The *monomer molecule*(8) is an arrangement of atoms which can be *made*(9) to react with similar monomer molecules to form a chain. The reaction is *known*(10) as polymerization.

The *monomers*(11) from which plastics are made are generally produced by separation from natural gases or from *oil*(12). By means of pressure and heat, and often with the aid of *catalysts*(13), the monomer molecules react and form polymer molecules, and by *careful*(14) control of the polymerization, the monomer molecules may be arranged, obtaining the required properties

Now answer the following questions using the information from the reading above.

1. Is the word *plastics* countable or uncountable? Is it used in this sentence in a general or a specific sense?
2. *shaped* = give a synonym or explain the meaning of this verb.
3. *required* = Give a synonym
4. What is a "synthetic material"?
5. *are composed of* = Give a different expression
6. *long chain-like molecules* = Translate this into Spanish
7. *many* is the adjective of quantity for countable or uncountable nouns?
8. Is the word *molecule* countable or uncountable?. Is it used in a general or specific sense?
9. *made* is the PastPartiple of the verb ..... The past tense is …….
10. *known* is the Past Participle of the verb ..... The past tense is …….
11. Is the word *monomers* used in a general or a specific sense?
12. What is *oil*?
13. What is a *catalyst*?
14. *careful* is and adjective formed from which other word?

GRAMMAR: ARTICLES

The use of the article depends on the kind of statement and on whether the noun is countable or uncountable.

TYPE OF NOUN	GENERAL STATEMENT	SPECIFIC STATEMENT
Countable nouns		
- Singular	**A/THE**	**A/THE**
	A generator is a device to produce electricity *The atom consists of different subatomic particles*	*Power plants need a generator to produce electricity* *Bring me the calculator*
- **Plural**	**NO ARTICLE**	**THE (SOME)**
	Transformers are used to change voltage	*The monomers used in plastics come from oil*
Uncountable nouns		
-Only singular	**NO ARTICLE**	**THE (SOME)**
	Steel is an alloy of iron and carbon	*Don´t drink the water in the bottle* *Add (some) water*

NOTE: Pages, chapters, figures, etc. DO NOT use an article when followed by the number/letter (e.g. = *the results are shown in figure 3*)

Names of sciences are SING nouns used with NO ARTICLE (e.g = *Physics studies the properties of materials*)

It is very common to use a POSSESSIVE adjective (ITS/THEIR) instead of the DEFINITE ARTICLE. Eg= *materials can be classified depending on their conductivity*

EXERCISES: ARTICLES

A. Add the appropriate article or possessive adjective for each of these sentences.

1.....corrosion is .....very serious problem in..... metallic structures.

2.....iron is used in ..... engineering due to .....strength.

3..... physical properties of ..... matter will be studied in ..... chapter 3.

4..... fission is one of ..... two types of ..... nuclear reactions which release..... large amounts of..... energy. .....fission of ..... Uranium atoms is used in ..... nuclear power plants to generate ..... electricity.

5..... major component of ..... steel is ..... iron, ... metal that in ..... pure state is not much harder than ..... copper.

6..... silicon is used as ..... semiconductor in ..... manufacture of ..... chips.

7..... plastics may be classified into two major groups according to ..... chemical composition.

8..... mathematics is basic for ..... engineer.

9..... alloy is ……. metallic substance composed of two or more elements as either ..... compound or ……. solution.

10.In .....Kevlar, ... artificial fiber, ……. molecules lie straight, giving it ..... strength and ..... stiffness

B. Read this description of MERCURY and decide which, if any, article to use.

_____ mercury is _____ chemical element whose symbol is Hg. It is _____ silvery-white, heavy, liquid metal. Compared with other metals, it is _____ poor conductor of _____ heat and _____ fair conductor of _____ electricity. _____ mercury is _____ only common metal that is _____ liquid at _____ ordinary temperatures. It easily forms _____ alloys with many other metals. When it combines with certain metals (such as _____ silver, _____ zinc or _____ tin) _____ resulting alloy is called _____ amalgam. Both _____ element and _____ most of _____ compounds are poisonous. _____ mercury and _____ compounds are used in _____ electrolytic cells, _____ dentistry, _____ thermometers, _____ batteries, and in _____ medicine.

Source: Webster's International Encyclopedia.

VOCABULARY: ADJECTIVES

When describing, one of the most usual word classes is adjectives. Look at the following characteristics and classify them using the categories given below.

huge	cool	rectangular	straight	icy	ferrous	sticky
rough	tiny	light	bright	minute	short	curved
boiling	molten	hard	smooth	golden	synthetic	broad
cylindrical	metallic	dark	large	plastic	organic	rounded
square	soft	warm	burning	opaque	reddish	sharp

TEMPERATURE

TEXTURE

SHAPE

COMPOSITION

SIZE

COLOUR

WORD FORMATION

When describing, it is very common to use adjectives. That is why it is important to know how to form adjectives from other word classes. Here are examples of some of the most important SUFFIXES.

ADJECTIVES FROM NOUNS

LATIN ORIGIN OR ROOT		ENGLISH ORIGIN OR ROOT	
-IC	*atomic*	-FUL	*beautiful*
-AL/AR	*usual/linear*	-LESS	*harmless*
-OUS	*poisonous/ lustrous*	-(L)Y	*sunny*
		-ISH	*yellowish*

ADJECTIVES FROM VERBS

-ING	*shining*
-ED	*concentrated*

ADJECTIVES usually FROM VERBS

-IBLE/ -ABLE	*responsible/drinkable*
-ENT / -ANT	*different/important*
-IVE	*destructive*

EXERCISES

A. Write down examples for each of the suffixes given.

-IC _____ -FUL _____ -IBLE/-ABLE _____
-AL/-AR _____ -LESS _____ -ENT/-ANT _____
-OUS _____ -(L)Y _____ -IVE _____

B. Form adjectives as shown above from the following words.

Period	Impress	Symmetry
Danger	Eat	Hazard
Harm	Pain	Home

C. Now, read this text about TIN and underline all those adjectives or adverbs which use one of these suffixes in their formation.

Tin (1) is a pure element belonging to the carbon group (2). It is a soft, silvery-white metal with a bluish aspect (3), known (4) to the ancients as bronze, an alloy with copper. Tin is widely used for plating steel cans (5) used as food containers, in metals used for bearings and in solder.

Tin is non-toxic, ductile (6), malleable and adapted to all kinds of cold-working such as rolling, spinning and extrusion. The colour of pure tin is retained during exposure (7) because a thin invisible, protective layer (8) of tin oxide is formed by reaction with the oxygen of the air. The low melting point (9) of tin and its firm adhesion to clean surfaces facilitate its use as an oxidation-resistant coating material (10).

As (11) tin is fairly weak (12), it is not used in structures unless alloyed with other metals; yet (13) it has become a very common metal in alloys for industry.

Source: Britannica Encyclopaedia.

QUESTIONS

1- What is the symbol for tin?
2- Translate the sentence BELONGING TO THE CARBON GROUP
3- BLUISH ASPECT in Spanish is …….
4- KNOWN: what verbal form is it: PRESENT, PAST or PAST PARTICIPLE?
5- Translate the sentence TIN .....CANS
6- Explain this property in English
7- EXPOSURE: translate into Spanish. What word class is it?
8- Translate into Spanish BECAUSE .....LAYER
9- Explain in English LOW MELTING POINT
10- Translate AN OXIDATION-RESISTANT COATING MATERIAL
11- What is the meaning of AS in this sentence?
12- Translate into Spanish FAIRLY WEAK
13- Translate YET into Spanish

D- Complete the following text by adding the appropriate suffix to form the corresponding adjectives

STAINLESS STEELS

Stain_____ steels contain chromium, nickel and other alloy_____ elements that keep them rust resist____ in spite of the action of moisture or corros_____ acids and gases. Some steels have unus_____ strength.Because of their shin_____ surfaces architects wide____ use them for decorat_____ purposes.

LISTENING2: METALS AND NON METALS

See QR index U1.2 p.163

Complete the text with the word(s) or expressions you hear.

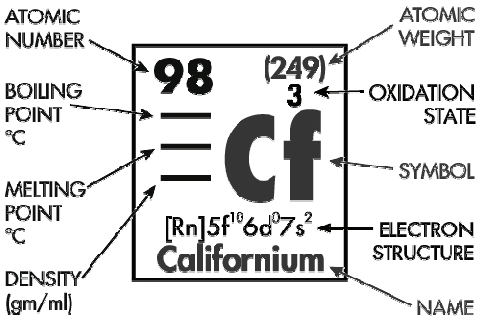
The most commonly used metal in industry is _____ .Its symbol is _____, its atomic weight _____, and its specific weight is _____. Its melting point is _____; this is a metal which is magnetised quite strongly but above _____, it cannot be magnetised.

Another metal of a great importance in engineering is _____, with an atomic weight of _____, a specific weight of _____, and its melting point is _____.

Among metals, _____ is the metal which possesses the highest density, with an atomic weight of _____ and a specific weight of _____; contrarily to other metals, however, its melting point is relatively low as it melts at _____.

However not all metals have the same characteristics; as an example we have _____, which is _____ at room temperature; thus, the temperature at which this metal changes from liquid to solid is _____and its boiling point is _____.

Non-metals, on the other hand, vary greatly with regard to their characteristics. For example, _____ has a specific weight of _____ and its boiling point is _____ .However, _____, whose specific weight is _____, melts at _____ and boils at _____.



EXPRESSING MEASUREMENT

The most common ways of expressing measurement are the following:

- **X is 3 m+ADJ (ex: The bar is 3m LONG)**
- **X is 3m + IN+NOUN (ex:the bar is 3m IN LENGTH)**
- **X has a +NOUN + Of 3m (ex: the bar has A LENGTH OF 3m)**
- **The NOUN + OF X is 3m (ex: THE LENGTH OF THE BAR IS 3M)**

EXERCISES

A.Measurement nouns are difficult to spell. Underline the correct spelling.

LONG	longth	length	lengeth	lenght	longht
HIGH	haight	hight	heigth	hieght	height
WIDE	wideth	wiedth	width	widht	wiedht
DEEP	depeth	depht	deepth	depth	deepht
To WEIGH	wiegh	weight	weigth	waight	wight
BROAD	broadth	broadness	breadth	broadht	breaht
THICK	thickness	thought	thougth	thicknes	thickht
THIN	thiness	thineth	thinnes	thineht	thinness

Para seguir leyendo haga click aquí