LESSON 3: PROPERTIES OF MATERIALS (by courtesy of A.Rozkošná)

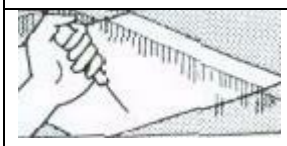
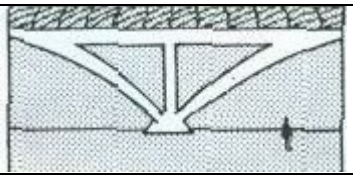
1. **Look at the materials listed below. What are your first associations with these materials? Talk about their properties and your favourite products made of them.**

Ceramics **Wood** **Rock** **Metals** **Composites**

2. Discuss these questions:

a) What is your favourite material for clothing? Do you prefer natural or synthetic materials? Why? What material are you wearing right now?
b) Do you know some modern hi-tech materials? (e.g. Gore-tex)? Which ones? Where are they used? What are their advantages over traditional materials?
c) Give examples of things which were originally made of natural materials and now are made of plastics. Why are plastics now used? Are there any disadvantages?
c) What materials can you see in this classroom? What objects are made of them?
d) What material is your watch / wallet / pen / book / shoes / computer / mobile phone / bottle made of?
e) What are some traditional and modern building materials? Give examples.

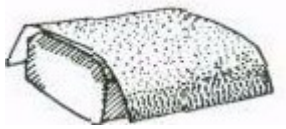
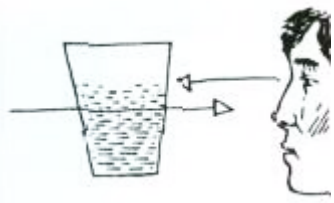
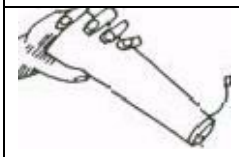
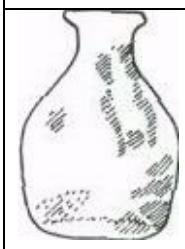
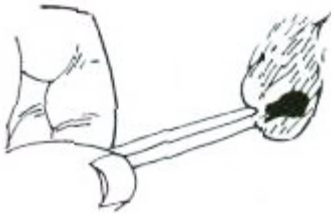
3. Read the following adjectives describing properties and give more examples of materials or things with this property. Form nouns from the adjectives:[1]

	A *brittle* material or thing breaks easily; e.g. glass, egg,. . **noun:**		A soft material is easy to scratch e.g. chalk **noun:**
	A *tough* material / thing does not *break* easily; e.g. steel,. . . **noun:**		A *flexible* material *bends* easily: e.g. rubber, .. **noun:**
	A *hard* material is difficult to *scratch.* *e*.g. glass, .. . **noun:**		A *rigid* material does not *bend* easily; e.g. concrete,... **noun:**

4. Now ask and answer these questions in pairs:

a) ***Example:*** *Why does a glass break if you drop it? Because it is brittle.*
b) Why doesn't a plastic glass break?
c) Why is butter easy to cut?
d) Why can a diamond cut glass?
e) Why do the branches of a tree bend in the wind?
f) Why don't the walls of a house bend in the wind?
g) Which is more flexible: a wooden ruler or a plastic ruler?
h) What are the different properties of green wood (on a tree) and dry wood?

5. Now complete these:

	Some materials have a *smooth* surface; they produce little *friction* when they are rubbed; e.g. ice,... noun:		You can see through *transparent* materials; e.g. water,. … noun:
	Some materials have a *rough* surface and produce a lot of friction; e.g. sandpaper, . .. noun:		You cannot see through *translucent* materials but the light passes through them; e.g. dirty water, . . . noun:
	*Soluble* materials dissolve easily; e.g. salt,… noun:		You cannot see through *opaque* materials and the light cannot pass through them; e.g. metal,. . . noun:
	Materials which are *insoluble* do not *dissolve*; e.g. glass,... noun:		*Combustible* materials *burn* easily e.g. wood,... noun:

6. Complete the sentences below with appropriate words from exercises 4 and 6

a. The carbonates and phosphates of all metals are _____ in water but _____ in dilute acids.

b. The pale pink colour of quartz, which can range from _____ to translucent, is known as rose quartz.

c. Some colloids are _____ because of the Tyndal effect, which is the scattering of light by particles in the colloids.

d. System Soft Shot is a booster for dry and _____ hair.

e. _____ materials are liable to catch fire very easily and burn.

f. _____ is an important property of steel.

g. This PVC tubing offers excellent wear resistance and rubber-like _____.

h. A _____ substance or object is stiff & does not bend, stretch or twist easily.

7. Listening:

Listen to some properties of materials. Make notes in the form of a table.

From *Nucleus of General Science.* Unit 1, Listening Practice 2.

	material	**property**	**verbal structure**
Example:	*salt*	*soluble*	*dissolves easily*

8. Some other properties of materials. Form adjectives from these nouns.

Czech translation	Noun	Adjective
a) pružnost	***elasticity***	***elastic***
b) křehkost	fragility	
c) tažnost	malleability	
d) kujnost	ductility	
e) vodivost	conductivity	
f) žáruvzdornost	heat-resistance	
g) zápalnost	flammability	
h) jedovatost, toxicita	toxicity	
i) reaktivita	reactivity	
j) netečnost	inertness	
k) lehkost	lightness	
l) těžkost	heaviness	
m) savost, absorpčnost	absorbency	
n) viskozita, lepkavost	viscosity	
o) hustota	density	
p) trvanlivost, odolnost	durability	
q) odolnost proti korozi	corrosion resistance	
r) síla	strength	

9. Choose the right word in a sentence:

a) A conductive / conductivity material can be used to conduct electricity.
b) If a material is easy to stretch under stress, we call it elastic / elasticity.
c) If you want to improve durable / durability of a machine, clean it regularly.
d) Hard / hardness is an important property of steel.
e) Concrete is used for building because it is strong / strength.

Now choose 1 noun and 1 adjective from the table in Exercise 10 and use it in a sentence. Then read the sentences to your neighbours.

10. Speaking:

Work in pairs. One student describes something, using as many adjectives as he or she can. The second one asks questions. You should guess what it is. You can describe the colour, size, shape, origin, appearance, use etc. Then swap roles.

a) Describe two materials.
b) Now choose two objects from this room.
c) Finally, describe something such as an animal, plant, machine, substance, famous structure or invention.

Useful phrases:

The object	is	slightly relatively quite extremely very	small soluble in water hot silvery old

The	colour shape durability	of	the object	is	blue circular high

11. VOCABULARY[3]

Science and Technology: Fill in the gap with the correct word.

a. …….. are being carried out to find a cure for cancer.
Experiences Experiments Trials Research

b. Microscopes ……..very small objects many times to make them visible.
magnify enlarge expand increase

c. Radio signals are now often ……..by satellite.
received delivered transmitted dispersed

d. Computers are able to …… vast amounts of data very quickly.
digest convert adapt process

e. Solar power stations are able to …….. the energy of the sun.
maximise drive convert harness

f. Other …… energy sources include wind and wave power.
recyclable returnable reusable renewable

g. In some types of power station steam is used to ……turbines.
force turn drive rotate

h. Mercury is …….at room temperature
fluid liquid solid gas

i. Hydrogen and oxygen are the two …….. that make up water.
compounds atoms molecules elements

j. All ……..is composed of atoms.
stuff material substance matter

k. The …… of lead is greater than that of aluminium.
rigidity weight density volume

l. When water is heated it ……..more quickly.
evaporates condenses melts solidifies

m. The …….. of iron and oxygen produces rust.
reaction separation decomposition composition

n. Chemists study the composition of natural ……..
substances machines mixtures alloys

o. The …….. of water is 100°C.
melting point boiling point point of condensation freezing point

Adapted from: [1]Jirků, Dana et al. *English for Future Engineers.* Praha: ČVUT, 2007.
[2] Bates, Martin and Dudley-Evans, Tony: *Nucleus of General Science.* Longman 1990.
[3] J.Harbord: *Topic-based Vocabulary*.

GRAMMAR REVISION: tenses

I. Put verbs in brackets in the correct form and tense

Glass 1.(have)_____ many useful properties, but it 2.(be)_____ not a tough material, in fact it 3.(be)_____ very brittle. However, for many years already car producers 4.(use)_____ specially tough glass, with which they 5.(make)_____ car windows. Wood is a good building material but it is combustible. In the past people 6.(build)_____ mainly wooden houses and now we can observe that this kind of lodging 7.(become)_____ more and more popular. People like the cosy atmosphere and the nice smell that such material 8.(produce)_____. Who 9.(know)_____, maybe in the future, with yet another kind of modern technology we 10.(be able) _____ to live in fir but non-combustible cottages?