6. PERIODIC TABLE OF THE ELEMENTS

Introduction. In one minute try to write down as many elements in English as you can.

Video: Periodic Table http://www.youtube.com/watch?v=_6WfnhwyyCw
In pairs, check the meaning and pronunciation of these expressions:

unique	*derive*	*major*	*protons*
share	*refer to*	*occur*	*neutrons*
chart	*behaviour*	*nucleus*	*electrons*

A) Before watching the first part of the video (5.45 – 7.07) **complete these phrases**:

1. atoms …… of three basic parts
2. positively ……. protons
3. protons and neutrons form ……..
4. electrons are separated into …….
5. …… electrons are involved in transfer and sharing with other elements

- Watch the part and check your phrases.
- Describe the atom without looking at the phrases.

B)

- **What are these elements called – K, H, O?**
- **What do these symbols mean?**

Complete the definitions:

atomic number – refers to the number of …

atomic mass – is determined by …

isotopes – are atoms of the same element that have …

atomic mass unit – is equal to …

Watch the second part and check the diagram and the definitions above. 7.10–10.05

C) Complete the chart with a few examples of properties and 3 names of elements in each group. 18.40 – 20.20 **Then listen and compare.**

ALKALI METALS	ALKALINE EARTH METALS	OTHER METALS	METALLOIDS	NON-METALS	HALOGENS	NOBLE GASES

4. Find the following chemical elements, there are 15 of them. If you cross all of them, the remaining letters, if read from left to right, form a word. Which word is it?

	A	B	C	D	E	F	G	H	I
1	C	A	R	B	O	N	I	T	E
2	A	L	U	M	I	N	I	U	M
3	L	E	B	S	L	E	M	M	E
4	C	K	I	N	O	E	N	N	T
5	I	C	D	R	R	D	A	E	L
6	U	I	I	C	O	Z	I	N	C
7	M	N	U	R	A	N	I	U	M
8	S	R	M	O	S	M	I	U	M
9	Y	T	T	E	R	B	I	U	M

/ˊæl yəˈmɪn i əm/ /ˈɒz mi əm/ /ˈmɜr kyə ri/
/ˈkæl si əm/ /ruˈbɪd i əm/ /ˈni ɒn/
/ˈkɑr bən/ /ˈsoʊ di əm/ /ɪˈtɜr bi əm/
/ˈaɪ ərn/ /tɪn/ /ˈnɪk əl/
/lɛd/ /yʊˈreɪ ni əm/ /zɪŋk/
http://dictionary.reference.com/help/luna/IPA_pron_key.html

5. Speaking. Work in small groups. Try to answer these questions:

a) Which element makes more than 90 % of the universe?
b) What elements are present in the air? Do you know the percentages?
c) Which element is used as rocket fuel and as alternative fuel for cars?
d) What elements are present in the human body?
e) What are the three forms of carbon? What are their uses?
f) What is an isotope? Do you know any isotopes? Which ones?
g) Do you know any alloys (combinations of metals)? Which ones? What metals are they made of?
h) Which elements can be dangerous? How are they dangerous?

5. What do you know about arsenic?
Listening / Watching. ARSENIC. Watch the video and note down the uses of arsenic.[1]

Vocabulary:
sample (n) - vzorek
mould (n) – plíseň
volatile (adj) – těkavý
damp (adj) – vlhký
dispose of (v+prep) – zbavit se
feed livestock (v) – krmit dobytek
powder (n) – prášek
poisonous (adj) - jedovatý
vial (n) - lahvička

Uses of arsenic:

6. Reading: ARSENIC.
After you have read the text complete the table with suitable information.

ARSENIC[2]

Arsenic is the chemical element that has the symbol As, atomic number 33 and atomic mass 74.92. Arsenic was first documented by Albertus Magnus in 1250. The element is a steel grey, very brittle, crystalline solid.	**1**
Arsenic is a poisonous element that occurs in the earth's crust. It is metalloid with many allotropic forms, including a yellow (molecular non-metallic) and several black and grey forms (metalloids). Three metalloidal forms of arsenic, each with a different crystal structure, are found free in nature.	**2**
In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds. The most common oxidation states for arsenic are −3 (arsenides: usually alloy-like intermetallic compounds), +3 (arsenates(III) or arsenites, and most organoarsenic compounds), and +5 (arsenates: the most stable inorganic arsenic oxycompounds. Arsenic and its compounds are used as pesticides, herbicides, insecticides and in various alloys.	**3**
Arsenic is made on an industrial scale by heating appropriate minerals in the absence of air. The arsenic is condensed out as a solid. $FeAsS\ (700°C) \rightarrow FeS + As(g) \rightarrow As(s)$	**4**
Upon heating arsenic sublimes (transfers from the solid to the gaseous state, without passing through the liquid state).	**5**
You may be exposed to arsenic by taking in small amounts in food, water or air, by burning smoke from arsenic-treated wood, when living in an area with high levels of arsenic in rock or working in a job where arsenic is made or used.	**6**
Exposure to arsenic can cause many health problems. Being exposed to low levels for a long time can change the color of your skin. Exposure to high levels of arsenic can cause death.	**7**

Symbol	
Atomic number	
Atomic mass	
Properties	
Occurrence (Where is it found?)	
Forms	
Oxidation states	
Compounds	
Uses	
Production / lab preparation	
Ways of Exposure	
Effects of Exposure	

7. Now read the text again and complete the second chart with words needed for a description of an element.

Nouns	Verbs	Adjectives
symbol	*occurs*	*crystalline*

8. Speaking. Work in pairs. Without looking at the text, try to summarize all the facts that you have learnt about arsenic according to the tables in exercise 6 and 7.

10. Speaking. Work in pairs. Each student should choose 2-3 elements from the periodic table. Try to describe the position in periodic table, properties, occurrence, forms, compounds, uses, reactions etc. Use the standard phrases, structures and vocabulary. The other one has to guess which element it is.

You can use these phrases:

This element combines with …. to form …
It is used as / in ...
It is made by …

HOMEWORK: Circle the synonym (=word that means the same):[3]

1. Chemists study the composition of natural *substances*.
a. materials b. machines

2. Plastic products are hard to dispose of because they are almost *indestructible*.
a. unable to be destroyed b. unable to be constructed

3. Silicon is a nonmetallic element that is inexpensive because it is so *abundant* in minerals and rocks.
a. rare b. plentiful

4. When exposed to air and moisture, iron will *corrode*.
a. rust b. shine

5. After the fire, the police investigated the cause of the *combustion*.
a. burning b. excitement

6. Gasoline should be stored carefully because it is *flammable*.
a. fireproof b. able to catch fire easily

7. Heat can *convert* a solid to a liquid.
a. condense b. change

8. The ammonia was *diluted* in water to make it weaker.
a. thinned b. thickened

9. A *catalyst* speeds up a chemical reaction.
a. chemical agent b. forest animal

10. To obtain aluminum, metallurgists must *extract* it from bauxite.
a. remove b. destroy

11. The temperature on a Fahrenheit fever thermometer *ranges* from 94° to 108°.
a. extends b. contracts

12. The *volume* of air in a room can be measured in cubic feet.
a. quality b. quantity

13. Ten *minus* four equals six.
a. less b. plus

14. Newton *computed* the weights of the planets.
a. measured b. calculated

15. Water contains hydrogen and oxygen in a *ratio* of two to one.
a. proportion b. size

16. The price of gasoline was *quadrupled*, and there were fears it would go even higher.
a. multiplied by four b. divided by four

Sources:
[1] Available at http://www.youtube.com/watch?v=a2AbKwAvyos
[2] Adapted from www.wikipedia.org
[3] Zimmerrman, Fran. *English for Science*.New Jersey 1989.
Lesson adapted from materials by A. Suchomelova-Polomska
Useful website: www.webelements.com