INORGANIC NOMENCLATURE I

1. Grammar – Time Clauses.

Complete these sentences with your ideas. Then ask about them in pairs.

a) When as I get home today …….

b) As soon as this lesson finishes ……

c) After I finish my studies ……..

a) When I was a child ……..

d) When I attended secondary school …….. …….

e) …….. before I get too old.

f) When I´m on holiday ……

2. Revision: Elements and compounds. Work in small groups. Try to answer these questions.

a) What is the difference between an element (e.g. H) and a compound (e.g. H_2SO_4)? Try to write a definition of an element and a compound.
b) What types and groups of elements do you know?
c) Do you know any names of elements? What do you know about them?
d) What is an ion? What types of ions do you know? What is their charge?
e) What is an isotope? Give examples of isotopes.
f) What is the difference between binary and ternary compounds?
g) Give examples of some organic and inorganic compounds, acids and bases, salts, oxides, hydroxides. What do you know about them? What are their properties? What is their use?
h) Explain the terms: chemical symbol, chemical formula, chemical equation. Give examples.

Quiz – matching. Match each phrase with an element[2]:

1. a twenty-fifth wedding **anniversary**	A. mercury
2. maybe the first metal used by man	B. nickel
3. a can is made of it	C. oxygen
4. an American coin	D. nitrogen
5. 1st place medal	E. copper
6. breathe in	F. phosphorus
7. good for your teeth	G. silver
8. think of matches	H. iron
9. 80% of the air	I. tin
10. nuclear power can come out of this	J. hydrogen
11. the most widely used metal of all	K. gold
12. describes a particular type of blond hair	L. plutonium
13. think of the bomb	M. calcium
14. gives out light in the dark	N. sulphur
15. used in thermometers	O. platinum

LISTENING: How to Write Chemical Formulas from Compound Names
Answer the questions below. http://www.youtube.com/watch?v=mQpNjm7xB30

1. Describe the difference between an ionic and covalent compound.
2. What is the charge of transition metals ions ?
3. What is a polyatomic ion composed of ?
4. Which verb is used for saying that $Na^+ + Cl^-$ *gives* NaCl ?
5. What do you do to balance the formula of magnesium chloride ?
6. Why is writing formulas of covalent compounds easier?
7. What is the formula of tetraphosphorus decasulfide?

INORGANIC NOMENCLATURE

A. IONS.

Cations H^+ h plus / hydrogen ion / univalent positive hydrogen ion
Cu^{2+} c u two plus / divalent positive cuprum (copper) ion
Fe^{2+} Fe two plus / iron (2 +), iron (II), ferrous ion, divalent positive iron ion
Fe^{3+} Fe three plus / iron (3+), iron (III), ferric ion, trivalent positive iron ion
Hg_2^{2+} h g two two plus / mercury (I) ion

Anions: Cl^- c l minus / negative chlorine ion / negative univalent chlorine ion
OH^- OH minus / hydroxide ion

6. Nomenclature quiz. Complete these sentences.

a) The chemical symbol for the calcium ion is ……..

b) The chemical symbol for the fluoride ion is ……

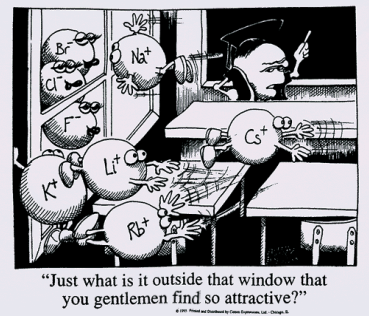
c) The chemical symbol for the ammonium ion is.....

d) The chemical symbol for the magnesium ion is.....

e) The chemical symbol for the sodium ion is.....

f) The chemical symbol for the aluminium ion is.....

Then check the exercise in pairs.
Ask and answer questions. (What is the chemical symbol for…?)



"Just what is it outside that window that you gentlemen find so attractive?"

B. BINARY COMPOUNDS (compounds that consist of a combination of two elements).

a) METALS WITH A FIXED CHARGE (one oxidation state)
Salts of oxo-acids, metal oxides and other binary compounds.

- metal + nonmetal with <u>-ide</u> [aid]

E.g. **NaCl - En : sodium chlor<u>ide</u>** [aid]
Cz : chlorid sodný (note: in Czech different order of elements than in English)

NaCl	sodium chlor**ide**	[kloraid]
$ZnCl_2$	zinc chlor**ide**	
CaC_2	calcium carb**ide**	[ka:baid]
MgS	magnesium sulph**ide**	[salfaid]
KHS	potassium hydrogen sulph**ide**	
Ca_3N_2	calcium nitr**ide**	[naitraid]
KNH_2	am**ide**	[**ə**´maid]
KCN	cyan**ide**	[´sai´naid]
K_2O	potassium ox**ide**	
ZnO	zinc ox**ide**	
CaO	calcium ox**ide**	

7. Nomenclature quiz: Write the chemical formulas of :

a) sodium fluoride

b) potassium hydrogen sulphide

c) silicon carbide

d) potassium cyanide

e) aluminium chloride

f) calcium nitride

g) zinc oxide

8. Write the names of these compounds:

a) Na_2C.....

b) NaCN.....

c) BaS.....

d) $CaCl_2$.....

e) Mg_3N_2 .....

f) $NaNH_2$.....

g) CaF_2.....

h) CaO …….....

Now check your answers in pairs. Spell the formulas.

b) METALS WITH A NON-FIXED CHARGE (occur in more than one oxidation state)
Metal oxides and other binary compounds with a non-fixed charge

2 methods of nomenclature:

Rational nomenclature (named according to IUPAC regulations)

Roman numeral expresses oxidation state

FeO	iron **(II)** oxi**de**
Fe_2O_3	iron **(III)** ox**ide**
Cu_2S	copper **(I)** sulf**ide**
CuS	copper **(II)** sulf**ide**
$FeCl_2$	iron **(II)** chlor**ide**
$FeCl_3$	iron **(III)** chlor**ide**

Older method (Latin name, trivial name)

- suffix -ous [-s] - indicates lower oxidation state -
suffix -ic [ic] - indicates higher oxidation state

Example:

FeO	ferr**ous** oxide	(lower oxidation state)
Fe_2O_3	ferr**ic** oxide are oxides of iron	(higher oxidation state)
Cu_2S	cupr**ous** sulfide	
CuS	cupr**ic** sulfide are sulfides of copper	

mercuric chloride and mercurous chloride are chlorides of mercury
arsenic oxide and arsenous oxide are oxides of arsenic
plumbic iodide and plumbous iodide are iodides of lead
stannic bromide and stannous bromide are bromides of tin, etc

Important: These suffixes have no absolute meaning. They just indicate the lower and the higher valence. Thus e.g. -ic means a valence of 2 in the case of copper and 3 in the case of iron . It is for this reason that Roman numerals are used.

c) NON-METALS (trivial names)

- Greek prefixes indicate the number of atoms of the element in the compound:
mono-, di-[dai], tri-[trai], tetra-, penta-, hexa-, hepta-, octa-, nona-, deca- + ide

Examples:

NO_2	nitrogen **di**oxide = nitrogen (IV) oxide	(1 atom of nitrogen, 2 atoms of oxygen)
N_2O_4	**di**nitrogen **tetr**oxide = dimer of Nit. (IV) oxide	
N_2O_5	**di**nitrogen **pent**oxide = nitrogen (V) oxide	
CO	carbon **mono**xide	
CO_2	carbon **di**oxide	
P_2O_3	**(di)**phosphorus **tr**ioxide	
OsO_4	osmium **tetro**xide	
P_2O_5	**di**phosphorus **pent**oxide	
PCl_3	phosphorus **tri**chloride	
CCl_4	carbon **tetra**chloride	
CS_2	carbon **di**sulfide	

d) PEROXIDES

An oxide containing more oxygen than some other oxide of the same element is called a peroxide.

H_2O_2	hydrogen peroxide	[´haidrədž ən pə ´ro,ksaid]
Na_2O_2	sodium peroxide	

Exercises:

9. Write the formulas of the following binary molecular compounds:

nitrogen monoxide.....
dinitrogen monoxide.....
sulfur trioxide.....
iron (II) sulphide.....
iron (III) sulphide.....
dichlorine monoxide.....
tetraphosphorus decoxide.....
oxygen difluoride.....
iron (II) cyanide.....
sodium peroxide …….

10. Write the names for the following formulas:

PI_3
SbF_5
P_2O_5
SO_3
$FeCl_3$
$FeCl_2$
$ZnCl_2$
CaO
H_2O_2

Now check your answers in pairs.

5. What alloys or other substances will you get if you mix the following?

1. copper and tin	A. **brass**
2. copper and zinc	B. cement
3. iron and carbon	C. concrete
4. lime, clay, sand and water	D. bronze
5. the above plus **gravel**	E. steel

Now say it in a sentence. ***e.g. When / if we mix copper and tin, we get …***

Sources: Adapted from Milada Pavlovová
and Marie Sabolová.

HOMEWORK: CONDITIONALS - PODMÍNKOVÉ VĚTY[3]

1. GRAMATICKÁ KONSTRUKCE TYPU I:

If I (+ čas přítomný)....., I´ll .....
If we go by bus, ***it will be*** cheaper.
If you don´t hurry, ***you´ll miss*** the train.

2. GRAMATICKÁ KONSTRUKCE TYPU II:

If I (+ čas minulý)....., I would…….
Jane lives in s city. She likes cities. She ***wouldn´t be*** happy if she ***lived*** in the country.
I´m sorry I can´t help you. I ***´d help*** you if I ***could.*** (but I can´t)
If we ***had*** a car, we ***would travel*** more.

Vedle tvaru ***was*** se běžně používá ***were***. Obojí je správně.
It would be nice if the weather ***were (was)*** better.

Věty typu I wish you were here.

I wish se použije, chceme-li vyjádřit, že je nám líto, že něco není tak, jak bychom si to přáli.
I wish I knew Paul's phone number. (je mi líto, že jej neznám)

3. GRAMATICKÁ KONSTRUKCE TYPU III:

If I + (tvar předminulého času).....I would (infinitiv minulý)……..
If we had gone by bus, ***it would have been*** cheaper.
I didn´t see you when you passed me in the street. If I ***´d seen*** you, I ***would have said*** hello.
I decided to stay at home last night. I ***would have gone*** out if I ***hadn´t been*** so tired.

Srovnejte typ II a typ III:
I´m not hungry. If I were hungry, I would eat something. (now)
I wasn´t hungry. If I had been hungry, I would have eaten something. (past)

Exercises:

a) Put the verbs in the right forms:

1. If you ***say*** (say) that again, I´***ll scream*** (scream).
2. I ..... (be) surprised if she .....(manage) to sell the car.
3. If the boys ..... (come) to supper, I ..... (cook) the chicken breasts.
4. I ..... (need) some money if we ..... (go) out tonight.
5. I ..... (miss) you if we ..... (move) to Wales.
6. If you ..... (wash up), I..... (dry).

b) They would be rather offended if I ***didn´t go*** to see them. (not/go)

1. If you took more exercise, you ……. better. (feel)
2. If I was offered the job, I think I ..... it. (take)
3. I´m sure she will lend you the money. I´d be very surprised if she ..... (refuse).
4. If I sold my car, I ..... much money for it. (not/get)
5. A lot of people would be out of work if the factory ..... . (close down)

d) I didn´t know you were in hospital. If ***I´d known*** (I/know), I ***would have gone*** (I/go) to visit you.

1. Ken got to the station in time to catch his train. If .....(he/miss) it,..... (he/be) late for his interview.
2. It´s good that you reminded me about Ann´s birthday. ..... (I/forget) if ..... (you/not/remind) me.
3. Unfortunately, I didn´t have my address book with me when I was in New York. If .... (I/have) your address, ... (I/send) you a postcard.
4. A: How was your holiday? Did you have a nice time? B: It was OK, but ……..... ..... (we/enjoy) it more if ..... (the weather/be) better.