13. ACIDS, BASES AND SALTS

1. Work in pairs. Ask and answer questions. Practice different tenses:

- **present perfect simple:** *Have you* ever *seen* a kangaroo?
- **present perfect continuous:** How long/since when *have you been studying* languages?
- **past simple:** When ***did*** *you start* learning English?

Questions A:

1. How long …… (you study) chemistry?
2. ……..you ever …… (meet) the president of the Czech Republic?
3. What …… (you do) last week?
4. How many countries ……. (you visit)?
5. Since when ……(you stay) in Brno ?
6. How long …….. (you know) your best friend?
7. Where …….(you go) on holiday last year?
8. How long ……. (you have) your mobile phone?

Questions B:

1. How long …….. (you learn) English?
2. ……you ever…… (be) to England?
3. When …….. (you finish) grammar school?
4. ……you already ……(read) Harry Potter ?
5. How long ……. (you live) in your town?
6. What …….. (you do) yesterday?
7. ……you ever ……. (eat) Japanese food?
8. How long ……. (you have) your computer?

2. What is the PH scale? What does it measure?

3. a) Put the strips of papers with food items along the scale, according to their PH factor from high alkaline, to alkaline, low alkaline, low acid, acid to high acid. What is important is their effect on the body– e.g. foods labelled as "highly acid" cause high acidity.

b) What problems might consuming too many acidic foods cause?

4. Acids, bases and salts – definitions.

Watch the video[1] Acids, bases and salts and complete the text below with missing pieces of information.

The Swedish chemist Svante Arrhenius introduced the theory of ionization and used this theory to explain much about the behaviour of acids and bases.

An Arrhenius acid is defined as any compound that _____ in aqueous solution to form _____ ions.

$HNO_3(aq) \rightarrow$ _____(aq) + $NO_3^-(aq)$

An Arrhenius base is defined as any compound that _____ in aqueous solution to form _____ ions.

$KOH(aq) \rightarrow K^+(aq)$ + _____(aq)

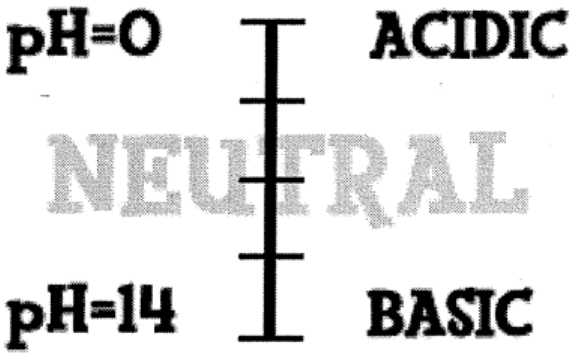
Salts are compounds that _____ in aqueous solution releasing _____ions.

$KCl \rightarrow$

5. Classifying compounds

Using the Arrhenius definition, classify the following examples as acids, bases and salts

HBr	KCl
$Mg(OH)_2$	$H_3 PO_4$
HCl	HClO
KNO_2	$Al(OH)_3$
HFO_4	$KC_2 H_3O_2$
$Ba(OH)_2$	NaCl



6. Naming acids and bases

a) Watch the video[1] and complete the text below

Since bases are _____ compounds, they are named in the usual way:
NH_4 OH –
$Al(OH)_3$ –

Binary acids consist of _____ elements, the first being _____. Binary acids are named using the format: _____+(root word of second element)+IC acid

Ternary acids consist of _____ elements. Do not use a prefix. Simply change the ending of the polyatomic ion's name and add the word _____. –ate ending becomes _____ and –ite becomes _____.

b) Now name the following acids:

HBr	H_3 PO_3
HNO_3	HC_2 H_3 O_2
HNO_2	H_2 CO_3
HI	$HClO_2$
	HF
	H_2 SO_3

7. Naming salts

a) Read the text below, and according to the information given, name the salts underneath, as in the example.

The name of a salt has two parts. The first part comes from the metal in the base or carbonate, or the metal itself if a reactive metal like magnesium or zinc is used. The second part of the name comes from the acid used to make it. The names of salts made from hydrochloric acids end in **–chloride,** while the name of salts made from sulfuric acid end in **–sulfate.**

metal		acid		salt
1. sodium hydroxide	reacts with	hydro**chloric** acid	to make	**sodium chloride**
2. copper oxide		hydro**chloric** acid		
3. sodium hydroxide		**sulfuric** acid		
4. zinc oxide		**sulfuric** acid		
5. ammonia		hydro**chloric acid**		

b) Write formulas of the reactions above

1.

2.

3.

4.

5.

8. Give formulas of these acids, bases and salts

boron silicide	magnesium phosphide
sodium hydroxide	zinc hydroxide
iron(III)chloride	aluminium sulfide
sulfuric acid	sulfurous acid

9. Chemistry quiz[2]

1. A solution has a pH of 4 – what does this mean?
   - It is acidic.
   - It is neutral.
   - It is alkaline.
2. Which of the statements below is correct?
   - Bases are acids that dissolve in water.
   - Bases are alkalis that dissolve in water.
   - Alkalis are bases that dissolve in water.
3. A liquid has a pH of 7. What does this tell you about the liquid?
   - It is water.
   - It is sodium chloride solution.
   - It is neutral.
4. Which salt is made when calcium carbonate reacts with hydrochloric acid?
   - sodium chloride
   - calcium chloride
   - calcium sulphate
5. Which pair of substances will react together to make copper sulfate?
   - copper and sulfuric acid
   - copper oxide and sulfuric acid
   - copper oxide and hydrochloric acid
6. Which is the correct order of methods for making a salt from an acid and an insoluble base?
   - filtration ➔ evaporation ➔ neutralisation
   - neutralisation ➔ evaporation ➔ filtration
   - neutralisation ➔ filtration ➔ evaporation

Week 13 - Acids and Bases – Vocabulary	
acid (n)	kyselina
binary acid (adj+n)	binární kyselina
ternary acid (adj+n)	ternární kyselina
acidic (adj)	kyselý
acidity (n)	kyselost
alkaline / basic (adj)	zásaditý
base / alkali (n)	zásada
alkalinity / basicity (n)	zásaditost
high alkaline	vysoce zásaditý
neutral (adj)	neutrální
salt (n)	sůl
pH scale	stupnice pH
introduce a new theory	představit novou teorii
aqueous solution (adj+n)	vodný roztok
dissociate (v)	štěpit se, disociovat
dissolve in water	rozpouštět se ve vodě
polyatomic ion (adj+n)	víceatomový iont
ionic compound (adj+n)	iontová sloučenina
ionization (n)	ionizace
reactive metal (adj+n)	reaktivní kov
neutralisation (n)	neutralizace
filtration (n)	filtrace
carbonate (n)	uhličitan
behaviour (n)	chování

Sources: [1] **Available at** www.gpb.org/chemistry-physics/chemistry/1101, visited on October 18, 2011
[2] **Available at** http://www.bbc.co.uk/apps/ifl/schools/gcsebitesize/science/quizengine?quiz=add_aqa_acidsbasestest&templateStyle=sciencehttp://www.innovations.gatech.edu/bioremediation/avindex.php

Lesson adapted from Agnieszka Suchomelová-Polomská.