ACIDS, BASES AND SALTS

I. What is the pH scale? What does it measure?

II.

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.

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

III. Acids, bases and salts – definitions; watch the video and complete the text below with missing pieces of information. www.gpb.org/chemistry-physics/chemistry/1101

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.

$KCl \rightarrow$

IV. Classifying compounds; using the Arrhenius definition, classify the following examples as acids, bases and salts (source: www.gpb.org/chemistry-physics/chemistry/1101)

HBr	KCl
$Mg(OH)_2$	H_3PO_4
HCl	HClO
KNO_2	$Al(OH)_3$
HFO_4	Na_2SO_4
$Ba(OH)_2$	NaCl

V.Naming acids and bases; (source: www.gpb.org/chemistry-physics/chemistry/1101)

a) watch the video and complete the text below

Since bases are _____ compounds, they are named in the usual way:

NH_4OH –

$Al(OH)_3$ –

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 _____.

Can you know give examples of polyatomic ions?

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
	$H_2 SO_3$

VI. Naming salts;

a) read the text below, and according to the information given, name the salts underneath, as in the example. (http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa/ions/acidsbasesrev4.shtml)

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

b) write formulas of the reactions above

1.
2.
3.
4.

VII. 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

source: English for Chemists, prepared by A. Suchomelová

Homework

http://www.bbc.co.uk/apps/ifl/schools/gcsebitesize/science/quizengine?quiz=add_aqa_acidsbasestest&templateStyle=science

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

GRAMMAR: Defining relative clauses

Complete the sentences below with an appropriate relative pronoun: (source: Oreska et al, 2006, *English for Chemists*)

1. Elements are substances _____ cannot be broken down by chemical methods any further.
2. Silver and gold are elements _____ are widely used in jewellery.
3. Kampus is the part of Masaryk University ____ seminar rooms are equipped with modern audio-visual systems.
4. Salt ____ comes from the sea is considered to be the best for cooking.
5. Our teacher is the person _____ instructions we must obey.
6. The beaker ____ you use for experiments has to be cleaned afterwards.
7. The scientists ____ discovered the presence of sodium in the Sun are Robert Bunsen and Gustav Kirchhoff.
8. _____ of you can describe a Bunsen burner?
9. _____ knows the symbols of all the chemical elements?
10. Destructive distillation is a method _____ involves separating a mixture of several components of different boiling points.

ARGUMENTATION

<table>
<tr><th colspan="2">Advantages / disadvantages</th></tr>
<tr><td>▪ It has both (its) advantages and disadvantages
▪ One of the advantages / disadvantages of...is
▪ There are advantages / disadvantages to...-ing
▪ A further advantage (of) / problem (with)... is</td><td>▪ There are certain drawbacks
▪ The (main) advantage / disadvantage of...is ...
▪ The (main) drawback (of) / problem (with) ... is
▪ What are the advantages and disadvantages of ...</td></tr>
<tr><th colspan="2">Different points of view are included</th></tr>
<tr><td>▪ While it is true to say that ...
▪ On the other hand, ...
▪ It is not always the case that ...
▪ On the contrary, ...
▪ This (question) can be looked at from several points of view. Firstly ...
▪ Opponents of ... take a very different view
▪ It is often suggested that ...</td><td>▪ This (problem) should be considered in relation to ...
▪ It can be examined in terms of ...
▪ Xxx. must be taken into account ...</td></tr>
<tr><th colspan="2">Your own point of view</th></tr>
<tr><td>▪ In my opinion
▪ The first thing to be considered is ...
▪ It is a fact that ...
▪ There is no doubt that ...</td><td>▪ I believe that (x I think)
▪ One of the main arguments in favour/against X is that ...</td></tr>
<tr><th>Agreement</th><th>Partial agreement</th></tr>
<tr><td>▪ I agree with X when he says/writes that...</td><td>▪ On the one hand ..... on the other hand
▪ ... but ...
▪ ... however ...</td></tr>
<tr><th>Emphatic agreement</th><th>Cautious agreement</th></tr>
<tr><td>▪ X is certainly correct when he says that ...
▪ I completely agree with X when he writes that...</td><td>▪ X may be correct when he says that...// is saying that ...</td></tr>
<tr><th>Disagreement</th><th>Contrast with what has preceded</th></tr>
<tr><td>▪ I disagree with X when he says that ...</td><td>▪ instead
▪ in comparison
▪ on the contrary
▪ on the other hand
▪ by contrast</td></tr>
<tr><th colspan="2">Conclusions</th></tr>
<tr><td colspan="2">▪ in conclusion in brief overall thus
▪ to conclude to summarize then finally
▪ to sum up briefly altogether therefore in addition</td></tr>
</table>

source: H.Němcová, English for Biologists