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RESEARCH REPORT
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M. Arminda PEDROSA [1] and M. Helena DIAS [2]
[1] *Departamento de Química, Faculdade de Ciências e Tecnologia, Universidade de Coimbra*
[2] *Escola Superior de Educação, Instituto Politécnico de Coimbra*

WATER IN CONTEXT: MANY MEANINGS FOR THE SAME WORD

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ABSTRACT: Information on students' views about tap water, physical states of water, pure water and water molecule was gathered through a questionnaire administered to groups of 10th year students, 12th year students and 3rd year students at a teacher training college, prospective primary teachers. Students' characterizations of tap water and interpretations of the familiar events and observations described in some of the questions, as well as of what they thought a water molecule was conveyed alternative conceptions, some of which have been reported as being held by younger students. Information was also gathered through the same questionnaire administered to three groups of 10th year students, on various occasions, after implementing a novel chemistry teaching strategy, within the compulsory curriculum. The alternative conceptions identified are discussed and implications for teaching, in general, and for teacher training programmes, in particular, are suggested. [*Chem. Educ. Res. Pract. Eur.*: 2000, *1*, 97-107]

KEYWORDS: *water; pure water; physical states of water; language and meaning; learning problems; alternative conceptions; meaningful learning; STS interrelations; teaching innovations; interdisciplinary programmes*

INTRODUCTION

Research findings on alternative conceptions in science (Driver, Squires, Rushworth, & Wood-Robinson, 1994; Driver, Guesne, & Tiberghien, 1985; McDermott, 1993; Osborne & Freyberg, 1985; Garnett Garnett, & Hackling, 1995) have contributed to uncover science learning problems and shortcomings related to traditional science teaching approaches. These convey and confirm empiricist-positivist views and attitudes, encompassing certainty, the absolute character of scientific truth (Nussbaum, 1989) and appear incompatible with the use of *real* problems, that is problems outside school walls, as contexts for science instruction and are likely to contribute to the separation in the students´ minds of the world of school science from life-world outside the school. Such teaching orientations might promote, or exacerbate, the tendency for rote learning and unthinking application of algorithms (Reif, 1983; Gabel *et al*, 1984; Yarroch, 1985; Haidar, 1997) and will lower *scientific literacy*.

The call for relevance of school science, namely to explicitly consider and address Science-Technology-Society (STS) interrelations and use them in school science has been discussed (Solomon, 1990) and recommended by many educational authorities worldwide. It may also be regarded as an attempt to orient curriculum towards school science for (more) meaningful learning and to improve scientific literacy. However, most science teachers were educated within the tradition of learning scientific disciplines separately which may imply and mean additional difficulties to approach science teaching using STS interrelations to present science following learning cycles (Musheno & Lawson, 1999), namely due to shortage of knowledge and confidence. Furthermore, teachers were and are educated within school science culture that encompasses what Kennedy (1998) calls recitation subject-matter knowledge**.** School science orientations of this kind support and promote fragmented storage of statements of concepts and procedures in the learners´ minds, rather than integrating them in their knowledge structure, and deprive learners of the ability to apply subject-matter knowledge appropriately (Haidar, 1997).

The purpose of the research herein reported was:

1. In the 1st part, to identify secondary school students' and prospective primary teachers' meanings of the word water;
2. In the 2nd part, to identify secondary school students' meanings of the word water, before and after a novel chemistry teaching intervention. This concerned 10^{th}-year chemistry compulsory curriculum, specifically the first curricular unit, "Amount in Chemistry" (as stated in the official documents);
3. To discuss information gathered in the 1st and 2nd parts, in order to
   a) identify misunderstandings concerning water;
   b) contribute to the evaluation of the novel chemistry teaching intervention.

The teaching innovations concerned the use of the theme *Water* as an *umbrella* under which STS interrelations were incorporated as a conducting thread in the teaching of the first curricular unit, in which stoichiometry and stoichiometric calculations are to be dealt with. The innovations also addressed, in different ways, some student alternative conceptions reported in the literature and prior discussed with the teachers involved.

METHODOLOGY

Information was obtained by means of students´ answers to four questions (see Appendix 1), that were part of a broader written questionnaire, answered in classes by all students present. The same questionnaire was administered to students once, twice or three times, depending on the groups.

The students involved in the study reported in the first part were studying in three different Portuguese institutions, corresponding to four different groups for the purposes of analysis:

- Secondary school students, 12th year, doing Chemistry in a public secondary school who responded to the same questions on two different occasions: in the beginning of the academic year (hereafter SEC1-1; n=45) and by the end of the academic year (hereafter SEC1-2; n=46);
- Secondary school students, 10th year, doing Chemistry (and Physics, as a curricular discipline) in two public secondary schools and in a private one who responded to the questions in the beginning of the academic year (hereafter SEC2-1; n=59);
- 3rd year students of a teacher training college, prospective primary teachers, who did not study sciences in secondary school (hereafter TTC1; n=31).

- 3rd year students of a teacher training college, prospective primary teachers, who studied sciences (including Chemistry) in secondary school (hereafter TTC2; n=53);

The latter two student groups, TTC1 and TTC2, had completed the 12th year in secondary school before enrolling in the 3-year degree.

2nd part: Students´ views on water prior to and after the chemistry teaching intervention

The students involved in the study that is reported in the second part of this paper were in their 10th year studying in three different Portuguese secondary schools, two public and one private, corresponding to three different groups for the purposes of analysis. They responded to the same questions on various occasions: two of them in three moments and one of them in two moments.

- Secondary school students, 10th year, doing Chemistry (and Physics, as a curricular discipline) in a public school who responded to the same questions in three occasions: before chemistry teaching started (hereafter SEC2/Sch1-1; n=19), after the teaching intervention (hereafter SEC2/Sch1-2; n=17), and at the end of chemistry teaching (hereafter SEC2/Sch1-3; n=17);
- Secondary school students, 10th year, doing Chemistry (and Physics, as a curricular discipline) in another public secondary school who responded to the same questions in three occasions: before chemistry teaching started (hereafter SEC2/Sch2-1; n=21), after the teaching intervention (hereafter SEC2/Sch2-2; n=20), and at the end of chemistry teaching (hereafter SEC2/Sch2-3; n=20);
- Secondary school students, 10th year, doing Chemistry (and Physics, as a curricular discipline) in a private school who responded to the same questions in two occasions: before chemistry teaching started (hereafter SEC2/Sch3-1; n=19), and after the teaching intervention (hereafter SEC2/Sch3-2; n=19).

Codes were allocated to the answers to multi-choice questions 1, 3 and 4. The answers to question 2 were read as many times as required to be sure of the ideas conveyed, to identify, write and allocate computer codes to them. Any doubt on this matter was discussed and agreement was reached.

SPSS (for windows) was used to undertake the required descriptive statistics. The questions used for the purpose of this study are described below.

RESULTS AND DISCUSSION

In what follows, each question will first be presented and then the information gathered from the analysis of students´ answers will be reported and discussed. The discussion will take into account similarities between groups based on extent of exposure to chemistry instruction. Students in TTC2 had similar exposure to either SEC1-1 or SEC1-2, depending on whether or not they took chemistry in the 12th year, while TTC1 and SEC2-1 students had been exposed to similar science and chemistry curricula in compulsory education. The three groups SEC/Sch1 and SEC/ Sch2, corresponding to the three moments of questionnaire administration, and the two groups SEC/ Sch3, corresponding to the two moments of questionnaire administration, are similar in this regard and for each moment (columns labeled 1, 2 and 3, or 1 and 2, in which each SEC/Sch is splitted).

TABLE 1.1. *Percentage of students (higher than, or equal to 10 %) who considered that tap water is not pure and who selected arguments, and with no answer.*

Tap water is not pure, because ...	*SEC1-2*	*SEC1-1*	*SEC2-1*	*TTC1*	*TTC2*
Tap water is not pure	100	91	90	84	92
Because ...					
it is unclean, often seems dirty	11	11			
it is not just water, it contains other substances	94	84	68	55	68
it contains other substances that can be harmful	33	29	27	36	25
it contains micro-organisms	24	36	20	13	19
it contains micro-organisms that can be harmful	11	24		19	11

TABLE 1.2. *Percentage of students (higher than, or equal to 10 %) who considered that tap water is not pure and who selected arguments, and with no answer.*

Tap water is not pure, because ...	*SEC/Sch1-*			*SEC/Sch2-*			*SEC/Sch3-*	
	1	*2*	*3*	*1*	*2*	*3*	*1*	*2*
Tap water is not pure	100	94	100	90	95	100	79	89
Because ...								
it is unclean, often seems dirty	11	12	12		15			
it is not just water, contains other substances dissolved	84	94	100	62	90	90	58	89
it contains other substances that can be harmful	21			14	15	15	47	21
it contains micro-organisms	21	12		10	10		32	37
it contains micro-organisms that can be harmful	---	---	---	10				11

In question 1 students were asked whether or not tap water is pure. In either case they were also asked to select, from a number of statements, those regarded as good arguments.

Students´ responses show a fairly high percentage of students in all the groups who considered that tap water is not pure (see Tables 1.1 and 1.2). The remaining students considered it pure. Tables 1.1 and 1.2 show the following:

1. The percentages of students who selected straightforward chemistry-based arguments in all groups are higher than biology-based or sensorial-based arguments;
2. For all groups, the percentages of students who selected arguments considering harmful effects of substances other than water:
   a) are lower than those based on straightforward chemistry-based arguments (as indicated in 1);
   b) there is not a general pattern when compared to arguments based on biological aspects.
3. Percentages of students selecting chemistry-based statement 2 increases following the order: TTC1, TTC2 and SEC2-1, SEC1-1, and SEC1-2 (see Table 1.1).
4. Regarding SEC2-1 corresponding to three classes (see Table 1.2) where teaching interventions occurred, the findings are as follows:

   a) The percentages of students selecting chemistry-based statement 2 increase from moment 1 to 2, and also to3 in one case, when applicable, that is from the beginning to the end of the academic year devoted to chemistry.
   b) The percentages of students selecting other statements in general decreased or did not

vary, except for SEC/Sch3 where the percentage of students selecting “it [water] contains micro-organisms” increased from moment 1 to moment 2.

c) For all groups, the very low percentages of agreement with statement 1 along with much higher ones with statement 2, indicate that chemistry instruction in general resulted in gains regarding views of tap water as mixtures of substances (may be as solutions). Teaching interventions appear particularly helpful in this regard, as the increase of percentages of agreement with statement 2 from moment 1 through to 3 show. It appears that gains are more evident and clearer in the cases of teaching interventions than chemistry instruction generally.

TABLE 2.1.1. *Percentage of students (higher than, or equal to 10 %) whose answers were codified, on the basis of references made to attributes, other than chemical, of pure water, within each of the following purity criteria, and with no answer.*

Water non-Chemical Purity Criteria	***SEC1-2***	***SEC1-1***	***SEC2-1***	***TTC1***	***TTC2***
Source-based			20	19	
Toxicity-based		29	29	26	
Consumer-based	18	33	26	45	32
Sensorial-based		13	22	45	40
No answer or uncategorizable	77	58	48	29	38

TABLE 2.1.2. *Percentage of students (higher than, or equal to 10 %) whose answers were coded, on the basis of references made to attributes, other than chemical, of pure water, within each of the following purity criteria, and with no answer.*

Water non-Chemical Purity Criteria	***SEC/Sch1-***			***SEC/Sch2-***			***SEC/Sch3-***	
	1	***2***	***3***	***1***	***2***	***3***	***1***	***2***
Source-based	21	---	---	24	---	---	21	---
Toxicity-based	27	---	12	24			37	
Consumer-based	32	18	---	19			26	---
Sensorial-based		---	---	24			37	---
No answer	53	82	88	52	95	95	37	94

Table 2.2.1 - *Percentage of students (higher than, or equal to 10 %) whose answers were codified on the basis of references made to chemical attributes of pure water, within each of the following purity criteria, and with no answer or uncategorizable.*

Water Chemical Purity Criteria	***SEC1-2***	***SEC1-1***	***SEC2-1***	***TTC1***	***TTC2***
Indicating misunderstandings, misinterpretations (1i)					
Pure water is made up of hydrogen and oxygen	11			---	
Indicating acceptable or ambiguous understandings (2i)					
Water is just water – no chemical symbols were used	23	18	27		17
... – no reference was made to H_3O^+ and OH^-	36	24		26	30
... – included acceptable elemental characterization			10		
... – and is distilled water	---	---	10		
No answer or uncategorizable	11	44	53	68	42

In question 2 students were asked to characterise pure water. The answers to this question were divided and coded into chemical and non-chemical categories; the summaries of the descriptive statistics undertaken are in Tables 2.1.1, 2.1.2, 2.2.1 and 2.2.2. These Tables show that in characterizing water:

1. The majority of SEC1 students, used chemistry criteria, in both moments (SEC1-1 and SEC1-2), as did all SEC/Sch1 students in moments 2 and 3. The opposite happened regarding the use of non-chemical criteria in all these groups;
2. Concerning non-chemical criteria, the percentage of SEC1 students who referred consumer-based criteria is, in both moments, the highest. Similar pattern applies to SEC/Schl students

TABLE 2.2.2. *Percentage of students (higher than, or equal to 10 %) whose answers were codified on the basis of references made to chemical attributes of pure water, within each of the following purity criteria, and with no answer.*

Water Chemical Purity Criteria	***SEC/Sch1-***			***SEC/Sch2-***			***SEC/Sch3-***	
	1	*2*	*3*	*1*	*2*	*3*	*1*	*2*
Indicating misunderstandings, misinterpretations (1i)								
Pure water is made up of hydrogen and oxygen	11	12			26			
Indicating acceptable or ambiguous understandings (2i)								
Water is just water – no chemical symbols used	11	29	35	24	32	21	47	44
... – included acceptable elemental characterization	16	59	65	10	32	58		44
... – and is distilled water	11			10			11	
... – macrosc. properties referred to: M.P., B.P. and dens.	11							
No answer	42	---	---	48			32	

in moments 1 and 2, while in moment 3 only toxicity-based criteria were referred to. Very few SEC/Sch2 and SEC/Sch3 students referred non-chemical criteria in moments 2 and 3. The percentage of students who referred sensorial-based criteria is equal to that of those who referred toxicity-based criteria, in both schools and in moment 1, though this percentage in school 3 is 37 % while that in school 1 is 24%. The percentage of students who referred source-based criteria is similar for SEC/Sch1, SEC/Sch2, SEC/Sch3 and TTC1. Source-based criteria are not referred to by any student in moments 2 and 3. Source-based criteria to characterize pure water indicate limited science knowledge;

3. The percentage of SEC/Sch students in moment 1 (or SEC2-1) and of TTC2 students who did not use chemistry criteria is similar to that of students who did not refer to non-chemical criteria, around 50 %;
4. The percentage of TTC2 students who referred sensorial-based criteria was the highest and was followed by the consumer-based ones. The percentages of students who referred to the remaining criteria were very low.
5. The majority of TTC1 students did not refer to chemistry criteria while the opposite happened regarding non-chemical criteria, where higher percentages concerned sensorial-based and consumer-based criteria, followed by those concerning toxicity-based. The lowest percentage regarded source-based criteria.

In addition, it must be pointed out that some SEC students considered pure water as made up of oxygen and hydrogen and as distilled water. Apparently the teaching interventions were effective.

These results show that, in general, students´ exposure to chemistry instruction results in answers progressively richer in chemistry based water characterization and progressively poorer in other criteria, e.g., toxicity-based or consumer-based. However, the percentage of TTC1 students who did not use chemistry-based criteria is remarkable higher than that of SEC2-1 students, in spite of similar exposure to chemistry instruction by both groups. The percentage of TTC2 students who referred sensorial-based criteria to characterize pure water is remarkable high and worrying.

Question 3 referred to the daily situation where a glass is left on the kitchen bench, after being washed up. Students were asked "*What happened to the water that did not drip onto the bench?*" and should select *the* statement they regarded as correct by ticking one of three offered statements, or else to write their own answers. The results of the descriptive statistics undertaken are presented in Tables 3.1 and 3.2. These Tables show that:

TABLE 3.1. *Percentage of students (higher than, or equal to 10 %) who considered as correct the statements offered or gave other answers.*

What happened to the water that did not …	***SEC1-2***	***SEC1-1***	***SEC2-1***	***TTC1***	***TTC2***
Was transformed into oxygen and hydrogen	29	42	25	65	40
Spread into the air as small bits of water (3)	38	31	42	19	36
Selects "Other": answers conveying idea (3)	27	22	27		21

TABLE 3.2. *Percentage of students (higher than, or equal to 10 %) who considered as correct the statements offered or gave other answers.*

What happened to the water that did not …	***SEC/Sch1-***			***SEC/Sch2-***			***SEC/Sch3-***	
	1	***2***	***3***	***1***	***2***	***3***	***1***	***2***
Was transformed into oxygen and hydrogen	11			43	16	20	21	
Spread into the air in very tiny drops of water (3)	63	53	71	29	63	65	37	78
Selects "Other": answers conveying idea (3)	21	41	24	29	21	15	24	22

1. The highest percentages of students in either TTC group, in SEC1-1 and in SEC/Sch2-1, concern those who selected "*was transformed into oxygen and hydrogen*";
2. The highest percentages of students in groups SEC1-2, SEC2-1, the three SEC/Sch1groups, SEC/Sch2 groups 2 and 3, and the two SEC/Sch3 groups selected "*Spread into the air as small bites of water*";
3. The three SEC/Sch groups, from moment 1 to the end of the academic year, show the following:

a) a general decrease of percentage of agreement with "*was transformed into oxygen and hydrogen*"; though the percentages by the end of academic year remained fairly high they are lower than those observed for SEC1-1 group;
b) a general increase of percentage of agreement with selected "*Spread into the air as small bites of water*".

Students in the various groups showed misconceptions regarding single element substances and chemical elements which lead to selecting that when water evaporates it is transformed into oxygen and hydrogen. Osborne and Freyberg (1985) provide evidence and discuss the influence of instruction on this view and Driver (1985) reports students´ views based on the idea that the nature of a substance changes when it undergoes a change of state. Further research is required for a better understanding of what students actually mean when they talk about evaporation using textbook-like discourses.

In question 4 students were asked to characterise a water molecule. The answers to this question were divided and coded into three categories. Procedures of descriptive statistics were undertaken. Tables 4.1 and 4.2. present the categories used and the percentage of answers coded per category and per student group. These Tables show that in characterizing a water molecule:

1. The majority of students in SEC1-2 and in all the SEC/Sch groups by the end of the academic year stated correctly the number of atoms of each element it is made of. In addition, some of these students, in particular SEC1-2 group, also referred correctly to other attributes, e.g., molecular geometry.
2. The majority of students in SEC2-1, TTC1 and TTC2 used a mixture of macroscopic properties, e.g., taste or boiling point, and of sub-microscopic attributes.
3. Very few students in all the groups used macroscopic properties, e.g., taste or boiling point, only.

TABLE 4.1. *Percentage of students (higher than, or equal to 10 %) per answer category, and with no answer.*

Characteristics of a water molecule	*SEC1-2*	*SEC1-1*	*SEC2-1*	*TTC1*	*TTC2*
Is made up of 1 oxygen atom and 2 hydrogen atoms and other correct attributes, e.g., molecular geometry	65	31	25	29	21
*Macroscopic and sub-microscopic properties	33	69	68	58	70
*Macroscopic properties	---	---		13	

TABLE 4.2. *Percentage of students (higher than, or equal to 10 %) per answer category, and with no answer.*

Characteristics of a water molecule	*SEC/Sch1-*			*SEC/Sch2-*			*SEC/Sch3-*	
	1	*2*	*3*	*1*	*2*	*3*	*1*	*2*
Is made up of 1 oxygen atom and 2 hydrogen atoms and other correct attributes, e.g., molecular geometry	26	35	65	19	35	85	32	63
*Macroscopic and sub-microscopic properties	68	65	35	71	50		63	32
*Macroscopic properties				10				

CONCLUSIONS AND IMPLICATIONS FOR INSTRUCTION

This study was undertaken in real classroom settings and encompassed diagnosing students´ views of different classes, namely with regard to exposure to chemistry instruction. Various groups are related in this regard. On the other hand, it involved students within chemistry classes, in the same school year in three schools, who answered the questions on different occasions throughout the academic year. This procedure was required so that we could have some insight about a non-traditional chemistry teaching intervention. It will be incorrect, and unintended, to generalise the results concerning the various groups to corresponding populations at large. However, they provide useful information on students´ views at different instruction levels, crucial to implement chemistry teaching centred on the learners. They are (and were) some of the evidence required for evaluating chemistry teaching interventions. The relative values of percentages concerning curricularly similar groups (regarding chemistry) may indicate that teaching interventions affected positively chemistry learning. In general, students involved in chemistry teaching interventions showed, within chemistry curriculum items, higher percentages of acceptable views and lower percentages of views encompassing misunderstandings than 12th year chemistry students. These were older and had studied chemistry for two more years. Thus, it may be interpreted as an evidence of added value of the novel teaching approaches adopted (Pedrosa, 1999).

Regarding non-chemical views apparently relevant to adequate understanding of water as resource, these approaches were not as successful. Attempting on percentages of curricularly similar groups (regarding chemistry), their relative values, concerning non-chemical characteristics of water as resource, support this view. As it was pointed out before, the opposite happened regarding chemistry perspectives of water as a resource, evaporation and characteristics of water molecule, particularly evident for TTC1 group. Both TTC groups showed poor knowledge of basic concepts required for a sound understanding of water in broader perspectives, e.g., consumer-based or toxicity-based. As these students were in their last year of pre-service primary teachers´ training degree, these results point to a need for more care and attention in these programmes so as to promote meaningful learning of issues relevant to primary education, like water. Generally speaking, differences between TTC1 and TTC2 groups, and SEC groups, particularly those involved in the novel teaching approaches, were particularly evident for questions 1 and 2, though influence of age differences and teacher training courses deserve further research.

The importance of water for the Globe, for chemistry and for chemistry education appears indisputable and they are all related with each other, regardless of the awareness level of the people concerned, citizens in general, politicians, chemists and specialists in other fields, chemistry and science educators at large. Acknowledgement and effective appreciation of the importance of water for the Globe, of the problems related to it and of solutions envisaged, whether or not they may be feasible, require basic chemistry knowledge. Appreciation of the outmost importance of water as a resource for world survival, thus for mankind survival too, requires, as a pre-requisite, an understanding of similarities and differences between water as a resource and water as a substance. Traditionally chemical education deals with substances, mixtures of substances and transformations of substances into others (chemical reactions); it is carried out in labs and classrooms and seems to have failed to pass the message that this is a culturally bound and operational way of working and studying. After all, to deepen the understanding and to improve explanations of many aspects of the outside material world is the goal of working and studying in chemistry, like in other sciences. Different and complimentary perspectives and approaches to chemistry (science) education are required to enable the construction of knowledge representations needed when education for citizenship is a matter of concern. To study water to educate for citizenship encompasses understanding of the many meanings of this word, namely common sense and chemistry meanings in daily situations and common language, as well as in chemistry, some of which have been illustrated in the Tables in this study, to enable a clear identification of similarities and differences in both languages and contexts.

Measures and actions to promote meaningful chemistry and science learning are required to make school science go beyond verbalisms, apparently too much focused on progress within the school system, to contribute effectively to science education for citizenship. In the Portuguese context, this encompasses curricular reforms where room needs to be left to implement research approaches to science teaching and learning where interdisciplinarity may be developed and implemented. This will promote pupils´ acknowledgement of the importance of learning science (also outside school contexts) which would emerge as adequate, purposeful and required, thus adding value to chemistry (and science) education. Simultaneously, action-research developed with teachers of the various science disciplines is required to build the knowledge, trust and confidence levels required in such interdisciplinary innovative teaching orientations. In addition, instruction resources concerning the way people spontaneously learn about the world (Musheno & Lawson, 1999) are also required. They should draw upon students´ personal prior knowledge and relate it to the use of specific terms, or of terms with particular meanings in chemistry, and link this to patterns or examples. To incorporate such an objective for teamwork with chemistry teachers provides a sense of purpose and of ownership vital for their involvement in action research (Pedrosa, 1999). Moreover, water appears to have an enormous potential to overcome knowledge compartimentalization underlying some of the findings of this study.

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ADDRESS FOR CORRESPONDENCE: *M. Arminda Pedrosa, Departamento de Química, Faculdade de Ciências e Tecnologia, Universidade de Coimbra, 3000 Coimbra, Portugal; fax: + 351-39-826541; email: apedrosa@ci.uc.pt*

APPENDIX

Question 1: *Water delivered in your school is supplied in a public network, commonly designated as "água da companhia"* – tap water.

a) *In your opinion is this* water *pure?*

b) *Please read the following statements and put a tick (in [ ]) before those that you consider as good arguments to base your opinion on.*

I. *You chose tap water is pure because...*

[ ] it is clean, it has no dirt

[ ] it is just water, that is, it does not contain other substances dissolved in it

[ ] in spite of containing other substances they are not harmful to our body

[ ] in spite of containing other substances, they exist in proportions that are not harmful to our body

II. *You chose tap water is not pure because...*

[ ] it is unclean, often seems dirty

[ ] it is not just water, it contains other substances

[ ] it contains other substances that can be harmful to our body

[ ] it contains microorganisms

[ ] it contains microorganisms that can be harmful to our body

Question 2: *How do you characterise pure water?*

Question 3: *A glass was left on the kitchen bench; then, after a while it was dry.*
What happened to the water that did not drip onto the bench?
Please read the following statements and put a tick (in [ ]) before the one that you consider the correct answer. If you don´t find any correct one, please write your answer after Other.

[ ] it dried up, that is, it no longer exists as anything.

[ ] it was transformed into oxygen and hydrogen and went into the air.
[ ] it went into the air in very small bites of water
[ ] Other: ....

Question 4: *How would you characterise a water molecule?*
1- *[ ] colourless* ***2-*** *[ ] liquid* ***3-*** *[ ] gaseous*
4- *[ ] it has 1 oxygen atom and 2 hydrogen atoms*
5- *Other: ....*

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