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Guidelines to Report the Results of Teaching Resources Testing

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Teaching Resource

3DMolSym (Molecular Symmetry)

<http://www.chem.auth.gr/chemsoft/3DMolSym/Index.htm>

Topics related to the resource

Chemical reactions, Chemical structure of molecules, closed formula of molecules', bond structure, symmetry chart

Examples of learning objectives

- To be able to draw molecules' symmetry structure.
- To be able to show molecule's bond structure.
- To be able to see molecules' features as 3D and try about them.
- To be able to indicate molecules' closed formula.

Practical information regarding the use of the site/simulation...

- Includes applications with regard to showing molecules' 3D structure.
- Students can see molecules's 3D features by trial
- Includes detailed applications about the molecule structure

Information about the class

Workgroup consist of 2013-2014 academic year's 18 students of science teacher training department of Kırıkkale University

Suggestion for use

- Firstly, students were informed about the works
- 3D simulation programme was analyzed, consist of 5 open ended question assessment instrument was developed. Before the using assessment instrument, pre-test was applied. Later, 3D simulation programme was runned and applications were done.
- Sample molecules's closed formulas, bond structure and symmetry features were examined.
- Students implemented these via computer.
- Assessment instrument which was developed end of the work, was implemented as post-test.
- Results of two applications were compared.
- Besides, students' remarks about the application was included.



Considerations about the resource

- Insights into student use / thinking

-Results of Applied to students assessment instrument;

	Pre-Test			Post-Test		
	True	False	Blank	True	False	Blank
1.Question:						
Closed Formula	16	2	0	16	1	1
Bond Structure	6	10	2	16	0	2
Symmetry Drawing	0	13	5	13	0	5
2.Question						
Closed Formula	16	0	2	15	0	3
Bond Structure	3	12	3	15	2	1
Symmetry Drawing	1	10	7	11	1	6
3.Question						
Closed Formula	13	1	4	18	0	0
Bond Structure	3	2	13	12	0	6
Symmetry Drawing	1	2	15	8	1	9
4. Question						
Closed Formula	4	6	8	17	0	1
Bond Structure	0	8	10	14	1	3
Symmetry Drawing	0	7	11	11	0	7
5. Question						
Closed Formula	15	0	3	18	0	0
Bond Structure	1	13	4	15	0	3
Symmetry Drawing	0	9	9	12	1	5

-When analyzing the results of work, 3D applications have yielded positive results in constitute the closed formulas of molecules', drawing bond structure and drawing symmetry.

-Students' remarks about the applications;

-Reminds old informations (2 students)

-It is useful for chemistry teaching (6 students)

-Embodies issue (4 students).

-Visualizes issues (9 students)

-Provides practicality. (1 student)

-Facilitate to understand (7 students)

-Provide permanent learning (6 students)

-Shows falses clearly. (8 students)

-Provides feedback (5 students)

- Teacher's conclusions

-Teacher candidates state that appreciate the 3D applications and facilitate to understand more effective.

-It is indicated that 3D applications provides more effective learning with students' active attendance.

Supporting info

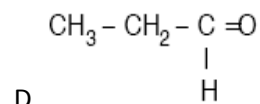
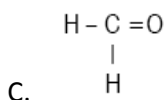
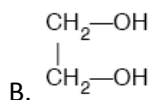
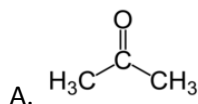
A) 3D applications assessment instrument is below;

1. Which of the following closed Formula of ethene compound ? Draw open formula of true answer and indicate molecule symmetry features.

- A. C_2H_6 B. C_2H_4 C. C_3H_8 D. CH_4

2. Draw Ammonia compound's symmetry feature, indicate its bonds.

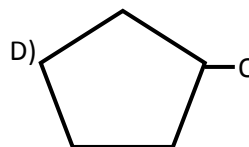
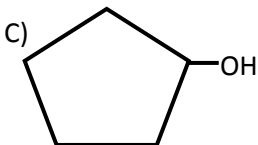
3. Which of the following is the formula of the compound of acetone? Circling the answer you've found the right formula for open Indicate molecular symmetry properties.



4. Draw Benzene compound's structure, indicate its molecule symmetry features.

5. Which of following is methanol compound's formula? Draw open formula of true answer and indicate molecule symmetry features

- A) CH_3OH B) $CH_3CH_2CH_2OH$



B) Some of application photos;

