



SUPPLEMENTARY MATERIAL TO  
**The macroscopic, submicroscopic and symbolic level in  
explanations of a chemical reaction provided  
by thirteen-year olds**

DRAGICA D. TRIVIC\*# and VESNA D. MILANOVIC#

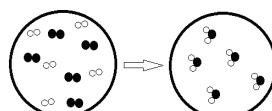
University of Belgrade – Faculty of Chemistry, Studentski trg 12–16, Belgrade, Serbia

J. Serb. Chem. Soc. 83 (10) (2018) 1177–1192

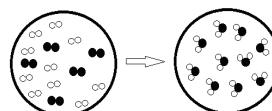
ADDENDUM 1: TEST

1. When flame is brought close to soap bubbles filled with a mixture of hydrogen and oxygen, a cracking sound is heard.
  - A. Circle the letter in front of the chemical reaction equation which corresponds to the change referred to above.
    - a)  $H_2 + O_2 \rightarrow H_2O$
    - b)  $2H_2 + O_2 \rightarrow 2H_2O$
    - c)  $2H + O \rightarrow H_2O$
    - d)  $H_2 + O \rightarrow H_2O$
  - B. Circle the letter in front of the picture that corresponds to the change referred to above and to the stoichiometric ratios of the reactants.

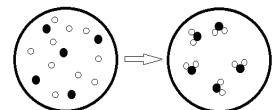
a)



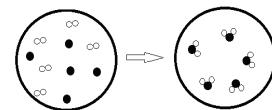
b)



c)

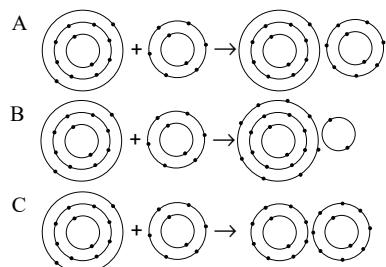


d)

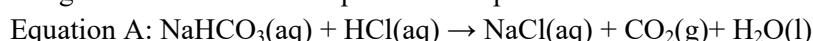


2. When a magnesium ribbon is inserted into the flame of a Bunsen burner, there occurs a synthesis reaction which produces an ionic compound of magnesium ( $_{12}Mg$ ) and oxygen ( $_8O$ ).
  - a) Write the equation of that chemical reaction.
  - b) Circle the letter in front of the picture that corresponds to the arrangement of electrons in the particles that make up the compound of magnesium and oxygen.

\*Corresponding author. E-mail: dtrivic@chem.bg.ac.rs



3. On the basis of the picture below and the chemical equations referred to below, circle the letter in front of the statement which corresponds to the changes of the substances depicted in the picture.



- a) Both of the above chemical reactions unfold in the apparatus shown in the picture.
- b) Only the chemical reaction shown by equation A unfolds in the apparatus shown in the picture.
- c) Only the chemical reaction shown by equation B unfolds in the apparatus shown in the picture.
- d) Neither of the chemical reactions shown by equations A and B unfolds in the apparatus shown in the picture.

#### ADDENDUM 2: INTERVIEW QUESTIONS

1. What does a chemical reaction equation represent? What information does a chemical reaction equation provide?
2. What do the coefficients in a chemical reaction equation represent?
3. Why is it important to determine the coefficients in a chemical equation?
4. What is the difference between a coefficient and an index?
5. Can you see, from the equation of a chemical reaction, the ratios of substances that mutually react?
6. Can you see the regrouping of the atoms from a chemical reaction equation?
7. On the basis of a chemical reaction equation, do you imagine particles colliding?