WEB OF SYNERGY:
International Interdisciplinary Research Journal
Volume 2 Issue 4, Year 2023 ISSN: 2835-3013
https://univerpubl.com/index.php/synergy

Chemistry Exercises and Problem Solving Use of Didactic Materials

Abduvaliyeva Komila Khudoyberdievna
Jizzakh State Pedagogical University, senior lecturer of the Department of Chemistry,
tunikom57@mail.ru

Article Information

Received: February 28, 2023
Accepted: March 28, 2023
Published: April 29, 2023

Keywords: *teaching methods, skills, abilities, chemical tasks, teaching methods, didactic materials, recommendations, educational process, stages.*

ANNOTATION

The article presents some methods and means of teaching students the skills and ability to solve chemical problems, and considers options for using didactic materials. The stages of effective mastering of the theoretical part and consolidation of new/passed material are also shown, general recommendations are considered, an approximate sequence is given, which should be followed for a more successful study of the curriculum.

In the period when the educational process is developing, in order to develop students' interest in science, the teacher tries to pass the lesson and get a good result from the lesson, using various methods. Various exhibits, slides, handouts, and other teaching aids are utilized to improve students' theoretical knowledge of chemistry, but problem-solving classes only use the method of solving problems from textbooks or additional literature.

General instructions for solving problems in chemistry:

It is known that mastering a theoretical material in chemistry and its reinforcement is often done through problem solving. Therefore, it is important to properly organize the process of solving the problem.

How to solve chemistry problems and exercises? You need a good plan to solve the problem. Below is such a plan. This plan will help you solve many problems in the future. The problem solving plan consists of 4 steps.

Stage I. Understanding the issue

- What have you been given and what are you being asked to find or prove? Express the problem in your own language.
- What information is provided? What chemical formula, reaction, or concept does the problem refer to, and what are its properties? What do you know about them? Identify

important information in the case.

- Matterdraw a diagram if possible according to the condition. This will clarify the matter for you.
- What other information, concepts, rules and properties do you need? Chemical formulas remember all the information, rules and properties about the connections between the elements given in the problem condition of the reactions and the elements that are required to be found. Determine what information is needed to answer the question in the problem.
- Does the problem provide all the necessary information about the chemical concept or law and its elements? Identify all the information to solve the problem.
- Stage II. Make a plan
- Have you solved a similar problem before? Remember other solved problems that aresimilar to the given problem.
- What properties or rules can be used?
- How do you go about solving the problem? Choose a way to solve the problem and make a plan how to implement it.
- Stage III. Implement a resolution plan
- Solve the problem step by step according to the plan. Look through each step.
- According to the plan, if drawing.
- Write the answer.
- Did you answer the given question? Check if you actually found the answer to the question pose in the problem.
- Does your solution satisfy the problem?
- Could the problem have been solved in another way? Think of a better way to solve the problem than the way you solved it.
- What did you learn that you can use to solve other problems? Think back to a problem you've solved or a solution you've used.

Consider the solution of some problems according to certain algorithms of actions.

Algorithm No. 1. Calculation of the mass of a substance from the known mass of another substance participating in the reaction.

PROBLEM: Calculate the mass of oxygen released as a result of the decomposition of a portion of water weighing 9 grams.

Sequence of actions

Using the appropriate notation, we write the condition of the problem

Let's find the molar masses of the substances we are talking about in the condition of the problem.

Making a solution to the problem

Given:

m (H2O)=9 g M(H2O)=18 g/mol

m (O2)=? M (O2)=32 g/mol

Let's find the amount of substance, the mass of which is given in the condition of the problem

Solution:

$$n(H_2O) = \frac{9g}{18\ g/mol} = 0{,}5\ mol$$

Let's write the reaction equation. Arrange the coefficients

$$2H_2O = 2H_2 + O_2$$

Above the formulas of substances, we write the quantities found under the formulas - stoichiometric ratios displayed by the reaction equation

$$\begin{array}{ccc} 0{,}5\ mol & & ?\ mol \\ 2\ H_2O & = & 2H_2O + O_2 \\ 2mol & & 1\ mol \end{array}$$

2H2O=2H2+O2

Calculate the amount of the substance whose mass is to be found. To do this, we make a proportion

$$\frac{0.5}{2} = \frac{x}{1}$$ whence x= 0.25

Therefore, n (O2)=0.25 mol

Find the mass of the substance to be calculated

m (O2)=n(O2)*M(O2)

m(O2)=0.25 mol * 32 g/mol =8 g

Let's write down the answer

Answer: m(O2) =8 g

Algorithm №. 2. Calculation according to the chemical equation of volumetric ratios of gases

PROBLEM: Calculate the volume of oxygen required to burn a portion of acetylene with a volume of 50 liters.

Sequence of actions

Using the appropriate notation, we write the condition of the problem

Given: $V(C_2H_2) = 50\ l$, $V(O_2) = ?\ l$

Let's write the reaction equation. Arrange the coefficients

2C2H2 + 5O2 = 4CO2 + 2 H2O

Above the formulas of substances, we write data on the volumes of gaseous substances, taken from the condition of the problem, and under the formulas, the stoichiometric ratios displayed by the reaction equation, which for gases, according to Avogadro's law, are equal to their volumetric ratios

$$\frac{50}{2} = \frac{x}{5}$$, so x= 125

Let's write down the answer

Answer: V(O2) = 125 l

Algorithm No. 3. Calculation of the mass of a substance in a solution from the mass of the solution and the mass fraction of the dissolved substance.

PROBLEM: Calculate the mass of sodium hydroxide required to prepare 400 g of a 20% sodium hydroxide solution.

Sequence of actions

Making a solution to the problem

Using the appropriate notation, we write the condition of the problem. We express the mass fraction of a substance using a decimal fraction (for this, the value of the mass fraction, expressed as a percentage, is divided by 100, moving the comma two decimal places to the left)

Given: m (NaOH) =400 g

w(NaOH)=20%, or 0,2

m elements (NaOH)=? g

We write down the formula for calculating the mass fraction of a substance in a solution

Solution:

$$W = \frac{m\ elements}{m\ solution}$$

Let's transform this formula to calculate the mass of a substance

Melement=mp-pa*u

Substitute the digital data in this formula and calculate

Melement(NaOH)=400g*0,2=80g

Let's write down the answer

Answer:m(NaOH)=80g

In problem-solving lessons, it is possible to increase students' interest in the lesson through theoretical and problem-solving methods through various didactic materials. For example, hard cardboard paper matching the color of red, yellow, blue and green elements in the periodic table. After a while, various round, square, triangular handouts are cut out. Problems are written on the handout. The answers to the problems should be such that if the yellow card is the p-family element, if the red card is the s-family element, if the blue card is the d-family element, and if the green card is f- be the number corresponding to the mass of the element of the family. The student learns the mass of the element when generating this number, and at the end gives information about this element.

The problems are written on the handouts as follows:

1. What is the number of sigma bonds in CaCO3*MgCO3 dolomite? 10 sigma bonds
2. Determine the mass fraction of N2 in NaNO3? 16.47%
3. How much HCl is produced when 18g of Cl2 reacts with H2 at room conditions? 18.5 g HCl
4. What is the total number of bonds in KMnO4 ? 8
5. Calculate the sum of coefficients in the following reaction H2 +O2→H2O ? 4
6. Calculate the total molecular mass of (NH4)2SO4 ? 132 gr.
7. Determine the mass fraction of C in Na2CO3? 11.32%
8. How many grams of Cl2 are needed to make 80 grams of HCl? 77.8 gr
9. How many grams of hydrogen are needed to get 18 grams of water? 2 g of H2

10. Calculate the mass of malachite mineral? 220 gr
11. Calculate the mass of Na2CO3? 106 gr
12. Calculate the mass of (NH4)SO4 ? 114 gr
13. How many grams of KCl are obtained from 132.72 grams of KClO3? 80.71 gr

In conclusion, it should be noted that the use of didactic materials in solving chemistry problems helps students to develop features such as interest and intelligence.

REFERENCES

1. Ishmuhamedov R., Abduqodirov A., Pardaev A. Innovative technologies in education / Practical recommendations. - T.: "Talent" Foundation, 2008.
2. Olimov QT Pedagogical technologies.- T.: "Fan and technologies" publishing house, 2011.
3. Rozieva D., Usmonboeva M., Haliqova Z. Interactive methods: essence and application / Method.hand. - T.: Statutory title. TDPU, 2013.
4. Ahadov M.Sh. Preparation of students for "PISA" international studies in modern chemical education. Child and time scientific magazine. Tashkent 2022 №. 1.
5. Ahadov M.Sh. Methodology for creating "lesson catalogs" for chemistry teachers.Scientific newsletter of Namangan State University. 2021/8 issue. 387-394 p.
6. Ikhtiyarova G, Bekchanov D, Ahadov M. Modern technologies in teaching chemistry. Tashkent. University publishing house. 2019. 67-69 p.