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RECOMMENDATIONS FOR FORMATION OF SCIENTIFIC LITERACY DEVELOPMENT IN STUDENTS ON THE BASIS OF THE PISA INTERNATIONAL ASSESSMENT PROGRAM

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Annotation
This article provides recommendations for shaping the development of students' natural science literacy as part of the PISA - International Student Assessment Program.

Keywords: PISA, Natural Science Literacy, International Assessment, International Experience, Natural Sciences, National Curriculum, Ability, Creative Thinking, Practice.

Introduction

At a time when our country is rapidly developing on the path of innovative development, to fully support the creative ideas and creativity of young people who are the successors of our future, to form their knowledge, skills and abilities and to improve the system of evaluation based on best international practices, international criteria and requirements. , a comprehensive comparative analysis of the existing system, close cooperation with relevant international and foreign organizations, agencies, research institutions. To this end, the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan "On measures to organize international research in the field of education quality assessment in the public education system" dated December 8, 2018 No 997 The National Center for International Studies was established. At the same time, the tasks for participation in international research to assess the quality of education were identified:

In accordance with the agreements signed between the State Inspectorate for Quality Control in Education and the Organization for Economic Cooperation and Development and the International Association for the Evaluation of Achievements in Education, participation in PISA and PIRLS international programs is planned for 2021. This is the first time that the literacy levels of students in the Republic of Uzbekistan have been tested, and it is important to prepare for them responsibly. To this end, it is important to develop students' specific skills through experiments based

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on assignments developed in accordance with the requirements of international research, and their gradual integration into the learning process.

The main goal is the literacy of students in natural sciences and the main means to achieve this goal is the study of natural sciences based on scientific knowledge. Significant changes are taking place in the organization of the teaching of science in schools. The teaching process includes skills such as analyzing data presented by students in various forms, substantiating and discussing experimental results, asking questions and planning key stages of research, predicting outcomes ("what happens ..."). intended to help shape.

The school has developed a National Curriculum for the comprehensive teaching of physics, chemistry and biology with the task of developing basic research skills, science literacy and substantiation of scientific views. New textbooks and textbooks for the natural sciences are being developed based on modernized programs.

Therefore, the tasks in this article, which are aimed at assessing students 'natural science literacy, are designed to assess students' literacy levels and can be used independently by physics teachers and students in secondary schools.

The following are examples of a set of tasks to assess students' natural literacy.

Level 1 tests based on the directions of the PISA-international assessment program.

1. Remember the basic rules of molecular kinetic theory.

Answer:_____
_____
_____

Answer: Matter is made up of tiny particles — molecules and atoms — that move in a chaotic, non-stop manner, and that atoms and molecules interact with each other and under the influence, the properties of substances are determined by the motion and interaction of these molecules

2. Determine the internal energy of 10 moles of monohydric gas at 270C?

A) 37.4 kj. B) 3740 kj C) 0.37 kj D) 3700 kj E) 3.7 kj

3. Describe why ink spreads when you write on low quality paper with ink.

Answer:_____
_____
_____

Answer: Low quality paper has a lot of capillaries, and the ink spreads to these capillaries**.**

4. Determine the amount of substance (H2O) in 2 liters of water.

$\rho = 1000\ kg/m^3$, M= 18 *10^{-3} kg/mol.

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Answer:

Given: H_2O

V=2 l= $2*10^{-3}$ m^3
$\rho = 1000\ kg/m^3$,
M= $18*10^{-3}$ kg/mol.

Should find: ν =?

Formula: $\nu = \frac{m}{M}$ (1)

$m = \rho * V$ (2)

1- and using Formulas 2, we create Formula 3:

$\nu = \frac{\rho * V}{M}$ (3)

(3) –we calculate according to the formula :

Calculation: $\nu = \frac{1000\frac{kg}{m^3} * 2 * 10^{-3}\ m^3}{18 * 10^{-3}\ \text{kg/mol.}}$ = 111,1 mol.

Answer: $\nu = 111{,}1\ mol.$

5. Use the law appropriate to the content of the sentence. "In the isochoric process ....."

A) ..... V and T change, P does not change
B) ..... P and T change, V does not change
C) ..... P and V change, T does not change
D) ..... P1 V1 T changes, and there is no heat exchange with the external environment.

Level 2 tests based on the directions of the PISA-international assessment program.

Nigora is in 9th grade. In physics class, the teacher gave the students a lot of information about temperature: "Temperature is a physical quantity that quantifies the temperature of a substance. The fact that the temperature is the same in all parts of the system is called the state of thermal equilibrium. Celsius (t, oC) and Kelvin (T, K) temperature scales are widely used in practice. T = t + 273. The lowest temperature that can be an absolute zero temperature is T = 0 K, which stops the thermal motion of the molecules. Drinking water freezes at 00C, boils at 1000C at normal atmospheric pressure, and does not change temperature above 1000C during evaporation. The density of water has the highest value at 40C ... "The temperature on the street. When Nigora comes home, she takes her body temperature. The thermometer read 38.3 ° C.

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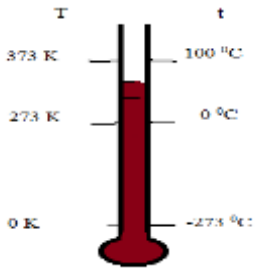

Q6: Classify thermometers by purpose?

Answer: Water temperature gauges, human temperature gauges (medical thermometers), air temperature gauges.

Q7: Assess Nigora's body temperature by knowing the normal body temperature of a healthy person.

Answer: healthy person = 36.6 oC; tNigora = 38.3 oC.

t = (38.3-36.6) oC = 1.7 oC. So Nigora has a fever.

Q8: Compare the data using the information above.

1	**0** °C= ... K	**7**	**0 K= ...** °C
2	**17** °C= ... K	**8**	**373 K= ...**°C
3	**-13** °C= ... K	**9**	**300 K= ...** °C
4	**-273** °C= ... K	**10**	**43 K= ...** °C
5	**100** °C= ... K	**11**	**6000 K= ...**°C
6	**-4** °C= ... K	**12**	**773 K= ...** °C

Q9: Make observations using the information above. There is ice and water on the street. Will the ice melt or will the water freeze?

_____

_____

Answer: 80 J of heat is required for each gram of ice to melt. For one gram of water to freeze, it must emit 80 J of heat. Heat exchange does not occur because the temperature is the same.

Q10: Gather the information above and give the correct answer.

№	Variants of the question	Correct answers:	№	Answer variants.
1.	Does the temperature change as boiling water evaporates?	2	1.	100°C
2.	Under normal conditions, the water boils at a few degrees.	1	2.	Not change.
3.	How many degrees does the water freeze?	4	3.	4°C
4.	4.What is the maximum value of the volume of a water bubble in a tightly closed container?	3	4	0°C

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Level 3 tests based on the directions of PISA-international assessment program.

11. What happens when a glass is turned upside down on a plate of water with a lighted candle on it? Answer: _____

_____

Answer: The candle flame goes out and the water from the plate is drawn into the glass.

12. When a cast iron ball is taken and filled with water and sealed and frozen, the cast iron ball will burst. How much energy does a cast iron ball explode?

Answer:_____

_____

_____

_____

Answer: When water freezes, molecules in ice crystals place themselves in a strict order with minimal energy. Excess energy of ice molecules is used to crack the cast iron ball.

13. Meat, vegetables, tomatoes and cucumbers are placed in the refrigerator. After a while, water formed in the upper container of the refrigerator. Where did this water come from?

Answer: _____

_____

_____

Answer: Water is formed from the condensed liquid that evaporates from the products placed in the refrigerator.

14. According to molecular-kinetic theory, the kinetic energy of a molecule depends on its velocity. Will the speed of the molecules be zero as they move?

Answer:_____

_____

_____

Answer: No. Only at absolute zero () can the velocity of a molecule be zero.

15. Give the formula for finding the density of a substance, knowing that the concentration of molecules is n = N / V.

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Answer:_____

_____

_____

Answer**:** $n = \frac{N}{V} = \frac{1}{V} * \frac{m}{M} * N_A = \frac{\rho}{m_0}$ $\rho = m_0 n$

These tasks assess students' creative and critical thinking skills, their ability to apply their knowledge in real life, and then stimulate the development of these skills. In addition to developing students' knowledge and skills in science, the school also develops the ability to apply their knowledge in a variety of life situations. In the future, these skills will help the school graduate to take an active part in public life, to increase their knowledge throughout their lives.

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