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**«Л.Н. ГУМИЛЕВ АТЫНДАҒЫ ЕУРАЗИЯ ҰЛТТЫҚ УНИВЕРСИТЕТІ» КЕАҚ**

**Студенттер мен жас ғалымдардың**
# «ǴYLYM JÁNE BILIM - 2023»
**XVIII Халықаралық ғылыми конференциясының**
**БАЯНДАМАЛАР ЖИНАҒЫ**

**СБОРНИК МАТЕРИАЛОВ**
**XVIII Международной научной конференции**
**студентов и молодых ученых**
# «ǴYLYM JÁNE BILIM - 2023»

**PROCEEDINGS**
**of the XVIII International Scientific Conference**
**for students and young scholars**
# «ǴYLYM JÁNE BILIM - 2023»

**2023**
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**«ǴYLYM JÁNE BILIM – 2023» студенттер мен жас ғалымдардың XVIII Халықаралық ғылыми конференциясы = XVIII Международная научная конференция студентов и молодых ученых «ǴYLYM JÁNE BILIM – 2023» = The XVIII International Scientific Conference for students and young scholars «ǴYLYM JÁNE BILIM – 2023». – Астана: – 6865 б. - қазақша, орысша, ағылшынша.**

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Жинаққа студенттердің, магистранттардың, докторанттардың және жас ғалымдардың жаратылыстану-техникалық және гуманитарлық ғылымдардың өзекті мәселелері бойынша баяндамалары енгізілген.

The proceedings are the papers of students, undergraduates, doctoral students and young researchers on topical issues of natural and technical sciences and humanities.

В сборник вошли доклады студентов, магистрантов, докторантов и молодых ученых по актуальным вопросам естественно-технических и гуманитарных наук.

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Таблица 2 Слой годового притока грунтовых вод при $УГВ_{min}$ = 343.50м

| k | k | Отметка дна водоёма | Площадь зеркала | УГВ | Отметка водоупора | УВВ |
|---|---|---|---|---|---|---|
| м/сут | м/с | м | $м^2$ | м | м | м |
| 9 | 0,000104 | 343,15 | 19684 | 343,50 | 337,84 | 343,497 |

| m | S | $r^0$ | R | $R+r^0$ | Q | Q | *Нпгв* |
|---|---|---|---|---|---|---|---|
| м | м | м | м | м | $м^3/сут$ | $м^3/год$ | м |
| 5,66 | 0,003 | 79 | 0,09 | 79 | 28 | 10368 | 0,53 |

Анализ приведённых таблиц показывает как при максимальном, так и при минимальном уровне грунтовых вод уровни воды в водоёме практически соответственно равны. Указанное объясняется высоким коэффициентом фильтрации, при котором радиус кривой депрессии *R* незначителен. Откуда приток грунтовой воды в водоём осуществляется практически со стороны дна водоёма.

Выводы

1. При нынешнем геологическом состоянии и уровней грунтовых вод водоем не подвержен высыханию.

2. Уровень водоёма, равно как и объём поддерживается грунтовыми водами, преимущественно со стороны дна водоёма.

3. Уровень воды в водоёме подвержен колебанию, соответствующим колебанию уровня грунтовых вод

3. Поскольку при минимальном уровне грунтовых вод глубина воды незначительная рекомендуется провести дноуглубительные работы на глубину необходимую для использования водоёма для конкретных целей.

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УДК 556

**PHYSICAL PROPERTIES OF WATER**


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Water is an inorganic compound with the chemical formula H2O. It is a transparent, tasteless, odorless and nearly colorless chemical substance, which is the main constituent of Earth's hydrosphere. It is vital for all known forms of life, despite not providing food, energy or organic micronutrients. Its chemical formula, H2O, indicate that each of its molecules contains one oxygen and two hydrogen atoms, connected by covalent bonds.

Water has several important physical properties. Although these properties are familiar because of the omnipresence of water, most of the physical properties of water are atypical. Given the low molar mass its constituent molecules, water has unusual large values of viscosity, surface tension, heat of vaporization and entropy of vaporization, all of which can be ascribed to the extensive hydrogen bonding interactions present in liquid water.

The physical properties of water are directly concerned with the appearance and interaction of water. Some physical properties are listed below[1].

1. Polarity
2. Hydrogen bonding
3. Specific heat capacity
4. Heat of vaporization
5. Density
6. Vapor pressure
7. Melting point
8. Boiling point
9. Freezing point anomaly
10. Cohesion
11. Adhesion
12. Surface tension
13. Capillary action

1. Polarity in water

Water is neutral molecule. It has an asymmetric internal distribution of charge that leads to positive and negative ends known as the polarity of water. The positive charge is on the hydrogen atoms while the negative charge is on the oxygen atom. These charges are generated due to the difference in the electronegativities of hydrogen and oxygen atoms. So, with being a neutral molecular compound, it also is polar.

2. Hydrogen bonding

Hydrogen bonding in water molecules is the reason behind most of its physical and chemical properties. It is the electrostatic force of attraction between highly electronegative oxygen (E.N ~ and partially positive hydrogen (E.N ~ 2.1).Thus, the electronegativity difference is 1.30.

Due to such difference in electronegativities, the oxygen atoms pulls the shared pair of electrons towards itself. As a result, the oxygen atom acquires a partial negative charge and the hydrogen atom acquires a partial positive charge. This polarity leads to the formation of a strong intermolecular force i.e. hydrogen bonding between water molecules and also gives it the possibility of forming such bonds with other similar molecules.

Water can dissolve many compounds like ethyl alcohol, carboxyl acid, etc by forming hydrogen bonds. This is what makes water a universal solvent.

3. Specific heat capacity

The amount of heat required to raise the temperature of 1 gram of a substance by 1 degree Celsius is known as its specific heat capacity. Water has a very high heat capacity of 4184 $J.kg^{-1}.K^{-1}$ at $25^oC$. This means that water does not heat up quickly, it keeps resisting this change as long as it can.

4. Advantages of high specific capacity of water.

It makes water a usable cooling reservoir for cars.

It can act as a cooling agent in nuclear reactors and also in machines and everywhere else.

In the daytime, gets heated more quickly than water because of its low specific heat capacity. The air around the sand becomes hot and rises. The cooled air from seawater moves towards land and forms the sea breeze.

At night, due to the low heat capacity of sand, it releases heat more quickly than water and gets cooled. The air above the sea now gets hotter than the air above the sand. The sea air now moves towards land and forms the land breeze.

These are the reasons coastal areas have moderate temperatures.

Along with this property, water is a cheap chemical as well, which makes its applications uncountable.

The heat of vaporization [2].

The amount of heat energy required to change the liquid substance into a gas at a specified pressure is known as the heat of vaporization. Water has a high heat of vaporization that is 40.65 $kj.mole^{-1}$.

5. Density

The ratio of the mass of an object to the volume of that object is known as its density. Water has a maximum density of 1.0 $gcm^{-3}$ at $4^oC$. It means that water gets denser at low temperatures but this rule is only valid till $4^o$ C. Below this temperature, water starts to expand as an anomalous property. Such a physical property of water is known as the anomalous property of water.

The table

At temperature below $4^o$ C, the density ice is less than water. This is because ice has an open cage – like crystalline structure. In ice, each water molecule is surrounded by the other four molecules of water in a tetrahedral array. This structure is held together by hydrogen bonding. As this structure creates spaces between molecules due to which it has expand, the ice gets less dense.

Thus ice floats on the water and makes an insulating layer that prevents the liquid water from freezing completely. In this way, the aquatic organisms can survive below the ice along with many other applications.

6. Vapor pressure

The pressure exerted by the vapors of water molecules in gaseous form is known as the vapor pressure of water. The vapor pressure of water is increasing with increasing temperature, just like any other typical liquid.

Vapor pressure is actually being opposed by the atmospheric such that the liquid stays put. Now, as this atmospheric pressure gets lower at altitudes, water will boil at less temperature on hills. For example, it takes $70^o$ C to boil water on the top of Mount Everest.

7. Melting point

It is the temperature at which water melts from solid ice into liquid water. The melting point of water is $0^o$ C.

The microscopic study of ice shows that molecules of ice are closely packed together in a regular pattern. When the temperature of ice increase, the motion of molecules also increases. At $0^o$ C the motion of molecules becomes enough to start moving apart and change into liquid water. Due to anomalous expansion of water upon freezing, it will also shrink upon melting.

8. Boiling point

It is the temperature at which water changes from liquid to the gaseous state. The boiling point of water depends upon the atmospheric pressure. At sea level, the boiling point of water is $100^o$ C, while at the top of Mount Everest where atmospheric pressure is significantly low, it boils at $70^o$ C.

At $5^o$ C, molecules of water slide over each other. When the temperature increases molecules move faster. At $100^o$ C, the motion of molecules is maximum and water is converted into vapors.

9. Freezing point

The temperature at which water changes from a liquid state into a solid is known as the freezing point of water. The freezing point of freshwater is $0^o$ C whereas the freezing point of seawater is $-1.8^o$ C. This is due to a colligative property of solutions, in this case, salt + water.

When decreasing the temperature of water the motion of molecules also decreases. At $0^o$ C the motion of molecules of water is too slow that they prefer getting arranged in a regular pattern (a crystal shape). At this point, they can only vibrate at their mean positions just like other typical solids. Hence, all the water molecules change from liquid to solid state[3].

10. Cohesion

The force of attraction by which one molecule of water is attracted to another water molecule is called cohesion. It is caused by hydrogen bonding and Van der Waal forces.

It is important for the transport of water in plans against gravity because transpiration pull is actively driven by this cohesive force among water molecules.

11. Adhesion

The force of attraction by which molecules of water are attracted to other substances (containers) is known as adhesion. It is caused by electrostatic and mechanical forces. This is the property of water that makes it a wetting liquid.

Examples:

The adhesion of water molecules to the window after rainfall.

Adhesion of wet sheets to the table also shows attractiveness.

12. Surface tension

Surface tension is the measure of the force necessary to stretch or break the surface of a liquid. It is due to the intermolecular forces on surface molecules of water and the atmospheric pressure pushing against them. Its unit is N/m. The water has higher surface tension than most other liquids.

The property of surface tension is responsible for the following:

Formation of water drops, spherical shape[4].

The stay of insects on the water surface without getting dipped or wet.

13. Capillary action

The tendency of water to rise in the thin tube is known as its capillary action. The presence of capillary action of water is due to the presence of both adhesion and cohesion forces.

Examples:

When we dip a paper in the water, the water molecules move up by capillary action. This property is used in ascending chromatography.

In plants, water moves from roots to the leaves by the capillary action.

Capillary action helps in the drainage of the tears from the eyes, etc.

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