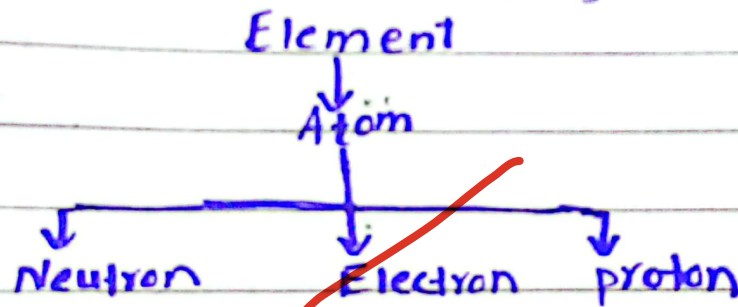


Q No 1 (a)  
What is an atom? Describe its structure and role of electrons, protons, and neutrons.

Atom:

Answer

John Dewey described that an atom is the smallest particle of an element which may or may not exist independently. Atoms are composed of electrons, protons, neutrons and some other sub-atomic particles. Examples: Hydrogen, oxygen



Structure of Atom and <sup>role of</sup> electron, proton and neutron:

Atom is overall neutral because it is composed of equal

attempt this part by giving subheadings

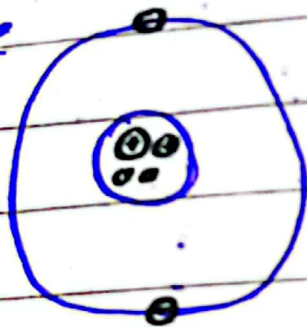
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number of oppositely charged particles in it. Atom has nucleus in its centre which contains protons and neutrons in it. protons are positively charged while neutrons are neutral. Electrons revolve around the nucleus and are negatively charged particles. Charges of electrons and protons cancel each other as they are equal in number.

Example:  ${}^4_2\text{He}$



$\ominus \rightarrow$  Electron

$\oplus \rightarrow$  proton

$\circ \rightarrow$  Neutron

Generally, an atom is represented as  ${}^A_Z\text{X}$ . 'Z' represents atomic number while 'A' represents atomic mass.

$A = \text{protons} + \text{Neutrons}$

$Z = \text{Number of protons}$

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Q no 1 (b)  
Define acids, bases and salts.  
Provide examples of each and  
their properties.

Answer

### Acids:

Definition: Arrhenius defined acids as compounds which can donate hydrogen ion ( $H^+$ ) when react with water, or when dissolved in aqueous solvent. while

Lewis further defined acid as molecules which are electron pair acceptors.

Examples:

$H_2SO_4$  (Sulphuric acid)

$CH_3COOH$  (Acetic acid)

Properties:

1. Acids are sour in taste.
2. Acid react with bases to form salt
3. Acids turn blue litmus red.

### Bases:

Definition:

Arrhenius defined bases as compounds which

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Can donate hydroxyl ion ( $\text{OH}^-$ )  
in aqueous solvent. Lewis  
further explained them as  
electron pair donors.

Examples:

Ammonia ( $\text{NH}_3$ )

$\text{NaOH}$  (Sodium Hydroxide)

Properties:

1. Bases are bitter in taste.
2. They turn red litmus blue.
3. They form salt when  
react with acid.

**Salts:**

Definition:

Salts are compounds  
which are produced by  
reaction of acids and bases,  
so they contain both hydrogen  
and hydroxyl ion. Salts are  
neutral compounds. They  
are formed by neutralization  
reaction of an acid or  
base.



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Examples:

- NaCl (Sodium chloride) .  
Known as common salt .
- KCl (Potassium Chloride)

Properties:

1. Salts are neutral in nature.

2. They dissolve hydrogen gas when react with metals

Q No 1 c)

Explain the Concept of pH Scale. How does it help in determining the acidity or alkalinity of a substance?

Answer

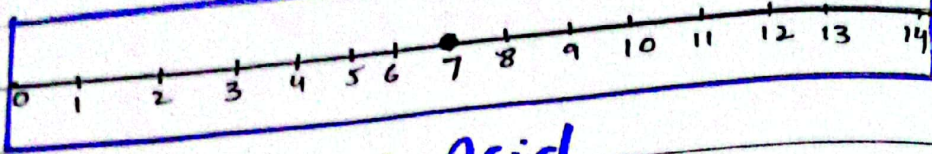
**pH Scale:**

pH Scale was discovered by Sorensen. It contains numbers from 0 to 14.

Number 0 to 6 represent acidity and number

8-14 represent basicity.

Number 7 represent neutrality.



0 → 6 → Acid

7 → Neutral

8 → 14 → Base

pH is negative logarithm of Hydrogen ion concentration.

$$pH = -\log [H^+]$$

$[H^+]$  means concentration of hydrogen ion in a molecule. when  $[H^+]$  is higher then pH becomes low and ranges from 0 → 6 and substance is identified as acid.

when  $[H^+]$  concentration in a molecule is low then its pH rises and range between 8 → 14 so it is

identified as base. while

pH of neutral molecules is

7. pH of water molecule

is 7. pH of Human blood is 7.35.

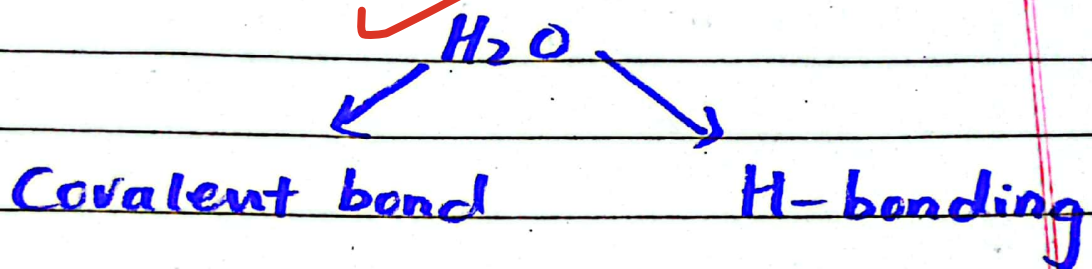
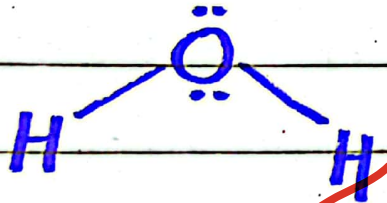
Q no 1 id)

Discuss the Chemical bonding in water molecules and its importance for life.

Answer.

Chemical Bonding in water molecule:

Water molecule is represented as  $H_2O$  and it contains covalent bonds and hydrogen bonds in it.

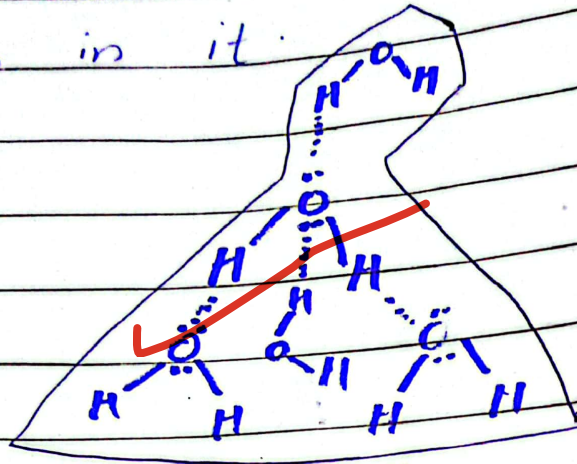
 $H_2O:$ 

Bond between oxygen and hydrogen is covalent bond where there is mutual sharing of electron pair between 'H' and oxygen. while  $H_2O$  also

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shows H-bonding because of having H-atoms and electronegative atom like oxygen. each  $H_2O$  can form 4 H-bonds and because of this water molecule has structure with holes in it.



H-bonding in  $H_2O$

## Importance of Chemical bonding in $H_2O$ for life:

1- Because of its unique bonding heat capacity of water is very high and it helps in sustaining its temperature on earth.

2- Because of H-bonding water readily solve many

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Kind of solvent and  
act as universal solvent.

3. Because of unique bonding  
of water it protects the  
aquatic life in winter by  
forming ice layer on top  
of water bodies.

4. Due to its bonds, water  
is used in many reactions  
in the body of living  
organisms and outside.

Q No 2 (a)

Primary causes of Air  
pollution:

Primary causes of  
air pollution are those which  
directly contribute to pollution  
of atmosphere or air.

These include oxides of carbon,  
nitrogen, sulphur and volatile  
organic compounds.

1- Oxides of Carbon:

These are  
carbon monoxide (CO) and

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Kinds of solutes and act as universal solvent.

3. Because of unique bonding of water it protects the aquatic life in winter by forming ice-layers on surface of water bodies.

4. Due to its bonds, water is used in many reactions in the body of living organisms and outside.

**Q No 2 (a)**

**Primary causes of Air pollution:**

Primary causes of air pollution are those which directly contribute to pollution of atmosphere or air.

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**1- Oxides of Carbon:**

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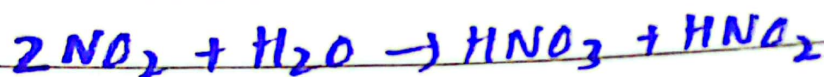
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carbon dioxide ( $\text{CO}_2$ ) They  
come from combustion of  
fossil fuels and incomplete  
combustion, forest fires  
and industrialization.

## 2- Oxides of Nitrogen:

oxides of  
nitrogen are nitrous oxide  
( $\text{N}_2\text{O}$ ),  $\text{NO}_2$  and  $\text{NO}_3$ .

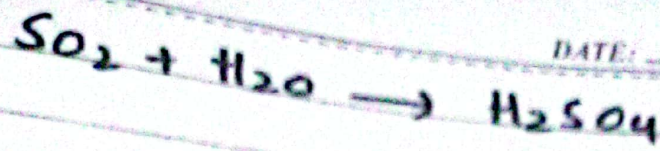
These are emitted from  
forest fires, burning and  
industries and transportation.  
They react with water  
vapours and cause acid  
rain.



## 3- Oxides of Sulphur:

oxides of  
Sulphur are  $\text{SO}_2$  and  $\text{SO}_3$ .

They are emitted by  
transportation, industries, volcanic  
eruption, and combustion of  
fossil fuels. They also  
cause acid rain.



Ways to reduce Air pollution:

1. Using electric vehicles
2. Reducing use of fossil fuels
3. Reducing green house gases emission.
4. Monitoring burning strictly
5. Reducing use of refrigerators and air conditioners

Q no 2 (b)

What is the impact of water pollution on human health and ecosystem.

Answer

**Definition of water pollution:**

The contamination of water in physical, biochemical and chemical ways, so it becomes ineffective for drinking and other purposes.

is called water pollution.

### Impacts of water pollution on human health:

- 1- Polluted water causes diseases upon drinking by water.
- 2- polluted water is harmful for plants, which then affects humans which feeds on them.
- 3- Polluted water harms liver, kidneys and stomach.
- 4- It causes diseases like Cholera, polio and typhoid.

### Impacts of water pollution on Ecosystem:

- 1- It impacts aquatic life.
- 2- It disturbs food chain.
- 3- It causes biodiversity loss.
- 4- It causes imbalance in ecosystem.

Q no 2 (c)

What is Climate change?  
How does it affect global weather patterns?

Answer

**Climate change:**

The irregular and disturbing <sup>climatic</sup> events occurring in the world because of continuously increasing temperature of the earth is called climate change.

Climate Change causes prolonged and intense summer, reduced and intense winters, heatwaves, droughts and many other irregular weather patterns. Climate Change is mainly caused by enhanced green house gases effect, and global warming. It is happening mainly because of green house gases.

emission like  $\text{CO}_2$ ,  $\text{SO}_2$   
and methane.

## Effect of Climate Change on global weather patterns:

1. Climate change causes melting of glaciers and rise in sea level causing irregular weather patterns.
- 2 - Climate change causes prolonged summers.
- 3 - It causes intense heat waves.
- 4 - It causes droughts.
- 5 - It causes intense winters with decreased temperature.
- 6 - It causes floods, volcanic eruption, earthquakes, irregular and heavy rainfall.

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emission like  $CO_2$ ,  $SO_2$   
and methane.  
**Effect of climate change  
on global weather  
patterns:**

1- Climate change

causes melting of glaciers  
and rise in sea level  
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2- Climate change causes  
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3- It causes intense heat  
waves.

4- It causes droughts.

5- It causes intense winter  
with decreased temperature.

6- It causes floods, volcanic  
eruption, earthquakes, irregular  
and heavy rainfalls.

Qno2 (b)

Explain the concept of Sustainable development and its significance in environmental protection.

(Answer)

**Sustainable Development:**

Sustainable development means development which effectively utilizes the current resources for development and it is long-term development without compromising the needs for future development. It can be achieved by Sustainable development goals (SDGs) achievement till 2030 which are set by United Nations. Some of SDGs include reducing poverty, gender equality, and environmental protection etc.

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## Significance of Sustainable development for environmental protection:

One of SDGs include environmental protection. While overall sustainable development is not possible without environmental protection. For sustainable development countries harness clean energy resources which in turn ensures environmental protection. For sustainable development use of fossil fuels is reduced for securing them for future and it causes reduction in air pollution, global warming and climate change which in turn ensures environmental protection.

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(3.5)

good answers overall!!!!