SA II CHEMISTRY TEST PAPERS I

Question 1 ( 1.0 marks)

Calculate the molecular mass of ammonia.

Solution:

Molecular Mass of NH3

= Atomic mass of nitrogen + 3 × Atomic mass of hydrogen

= 14 + 3 × 1

= 17 u

Question 2 ( 1.0 marks)

How is the chemical formula of a molecular compound determined?

Solution:

The chemical formula of a molecular compound is determined by the valency of each constituent element.

Question 3 ( 1.0 marks)

Write the formula of sodium carbonate.

Solution:



Question 4 ( 1.0 marks)

What are polyatomic ions?

Solution:

A polyatomic ion is a cluster of atoms acting as an ion.

Question 5 ( 1.0 marks)

Calculate the number of moles for 16 g of He.

Solution:

Number of moles = 

= 4

Question 6 ( 1.0 marks)

*Complete the oxygen cycle*.



Solution:



Question 7 ( 2.0 marks)

Calculate the mass of:

(i) 5 moles of H2 gas

(ii) 5 moles of H atom

Solution:

(i) Molar mass of H2 = 2

Mass = Molar mass × Number of moles

*m* = M × *n*

= 2 + 5

= 10 g

(ii) Molar mass of H= 1

Mass = Molar mass × Number of moles

*m* = M × *n*

= 1 + 5

= 5 g

Question 8 ( 2.0 marks)

Explain the two important laws of chemical combination.

Solution:

*Laws of chemical combination*:

**Law of conservation of mass** − During a chemical reaction, the sum of the masses of the reactants is the same as the sum of the masses of the products.

**Law of definite proportions** − In a pure chemical compound, each element is always present in a definite proportion by mass.

Question 9 ( 2.0 marks)

Calculate the number of particles in:

(i) 69 g of Na atom

(ii) 28 g of N2 molecules

Solution:

(i) Molar mass of Na = 23 g

∴Number of atoms



(ii) Molar mass of N2 = 14 × 2 = 28 g

∴ Number of atoms 



Question 10 ( 2.0 marks)

*Answer the following questions*.

(i) Write the electronic configuration of neon.

(ii) If Z = 14, find the number of valence electrons.

Solution:

(i) Electronic configuration of Ne = 2, 8

(ii) Z = 14

Electronic configuration = 2, 8, 4

∴Valency = 4

Question 11 ( 2.0 marks)

What are isotopes? Name the three isotopes of hydrogen.

Solution:

Isotopes are defined as the atoms of the same element, having the same atomic number, but different mass numbers.

The three isotopes of hydrogen are −

(i) Protium

(ii) Deuterium

(iii) Tritium

Question 12 ( 3.0 marks)

Write the important features of Rutherford’s experiment.

Solution:

*Features of Rutherford’s experiment*:

(i) A positively charged centre exists in an atom. This centre is called the nucleus. Nearly all the mass of the atom resides in the nucleus.

(ii) The electrons revolve in well-defined orbits around the nucleus.

(iii) The size of the nucleus is very small as compared to the size of the atom.

Question 13 ( 3.0 marks)

*Answer the following questions*.

(i) What role does the atmosphere play in climate control?

(ii) Explain the factors affecting the movement of air.

Solution:

(i) Air is a bad conductor of heat. The atmosphere keeps the average temperature of the earth fairly steady during a day, and even during the course of an entire year. The atmosphere prevents the sudden increase in temperature during daytime, and during night time, it slows down the escape of heat into outer space.

(ii) The movement of air results in diverse atmospheric phenomena. It is affected by the uneven heating of the atmosphere in different regions of the earth, which in turn is due to the heating of air and the formation of water vapour. The rotation of the earth and the presence of mountains in the paths of wind also affect the movement of air.

Question 14 ( 3.0 marks)

**A** reacts with **B** to produce **C** and **D**. The chemical equation involved in the reaction is as follows:

A + B → C + D

The mass of B, C and D is 24 g, 12 g and 20 g respectively. Calculate the mass of A.

Solution:

According to the law of conservation of mass, mass can neither be created nor be destroyed in a chemical reaction. Hence, in a chemical reaction, the mass of the reactants is equal to the mass of the products obtained.

Thus, in the given chemical equation:

Mass of A + Mass of B = Mass of C + Mass of D

Therefore, Mass of A + 24 = 12 + 20

Mass of A = 32 − 24 = 8

Hence, in the given chemical reaction, mass of A is 8 g.

Question 15 ( 5.0 marks)

*Answer the following questions*.

(i) Mention the importance of the sun in the formation of soil.

(ii) What is humus?

(iii) Write two methods by which carbon dioxide is added to the atmosphere.

Solution:

(i) During the day, the sun heats up rocks, thereby making them expand. At night, these rocks cool down and contract. However, all parts of a rock do not expand and contract at the same rate. This leads to the formation of cracks, which finally leads to the breaking up of big rocks into smaller pieces.

(ii) Soil is a mixture. It contains organic matter such as bits of decayed living organisms. This organic matter is called humus.

(iii) Carbon dioxide is released into the atmosphere by animals during the process of respiration. It is also released during volcanic eruptions.

SA II CHEMISTRY TEST PAPERS II

Question 1 ( 1.0 marks)

Why is oxygen diatomic?

Solution:

Oxygen is diatomic because the valency of oxygen is two, i.e., it needs to form two bonds to complete its octet. Hence, an oxygen molecule contains two oxygen atoms, chemically bonded to each other.

Question 2 ( 1.0 marks)

Calculate the formula unit mass of common salt.

Solution:

Chemical formula of common salt is NaCl.

Formula unit mass of NaCl

= 1 × Atomic mass of Na + 1 × Atomic mass of Cl

= 1 × 23 + 1 × 35.5

= 58.5 u

Question 3 ( 1.0 marks)

Define Avogadro constant (NA).

Solution:

Avogadro constant is defined as the number of atoms present in exactly 12 g of carbon-12.

NA = 6.022 × 1023

Question 4 ( 1.0 marks)

Define molar mass.

Solution:

The mass of 1 mole of a substance is called its molar mass.

Question 5 ( 1.0 marks)

Write the chemical formula for aluminium chloride.

Solution:

The chemical formula for aluminium chloride is AlCl3.

Question 6 ( 1.0 marks)

Write a use of an isotope of uranium.

Solution:

U-235, an isotope of uranium, is used as a fuel in nuclear reactors.

Question 7 ( 2.0 marks)

How many moles are present in 18.066 × 1023 of He atoms?

Solution:



Question 8 ( 2.0 marks)

Calculate the number of neutrons and protons in .

Solution:

Number of protons = Atomic number

Number of protons = 7

Number of neutrons = Atomic mass − Number of electrons

= 14 − 7

= 7

Question 9 ( 2.0 marks)

Name the parts labelled as *i*, *ii* and *iii* in the given figure.



Solution:

*i* − Petroleum

*ii* − Coal

*iii* − Limestone

Question 10 ( 2.0 marks)

Mention four methods for preventing soil erosion.

Solution:

*Soil erosion can be prevented by*:

(i) Planting trees

(ii) Preventing overgrazing and deforestation

(iii) Contour ploughing

(iv) Applying a layer of mulch and fertiliser over soil

Question 11 ( 2.0 marks)

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Forms of water** | **Snow, hail, ice** | **Water** | **Water vapour** |
| **Physical state** | \_\_\_\_\_\_\_\_\_\_\_\_\_ | Liquid | \_\_\_\_\_\_\_\_\_ |
| **Region of occurrence** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Fresh water is found in lakes, ponds, rivers, and ground water. Saline water is found in seas and oceans. | \_\_\_\_\_\_\_\_\_\_\_ |

Solution:

|  |  |  |  |
| --- | --- | --- | --- |
| **Forms of water** | **Snow, hail, ice** | **Water** | **Water vapour** |
| **Physical state** | Solid | Liquid | Gas |
| **Region of occurrence** | Frozen ice and snow in the polar regions and ice capped mountains | Fresh water is found in lakes, ponds, rivers, and ground water. Saline water is found in seas and oceans. | Atmosphere |

Question 12 ( 3.0 marks)

Write four postulates of Dalton’s atomic theory.

Solution:

*Four postulates of Dalton’s atomic theory*:

(i) All matter is made of very tiny particles called atoms.

(ii) Atoms are very small, indivisible particles

(iii) The atoms of a given element have identical mass and chemical properties.

(iv) Atoms combine in the ratio of small whole numbers to form compounds.

Question 13 ( 3.0 marks)

*Answer the following questions*.

(i) Calculate the maximum number of electrons in:

(a) K shell

(b) M shell

(ii) What are isobars? Give an example.

Solution:

(i) Maximum number of electrons in an orbit = 2*n*2

For K shell, *n* = 1

Maximum number of electrons = 2 × 12 = 2

For M shell, *n* = 3

Maximum number of electrons = 2 × 32 = 18

(ii) Isobars are atoms having the same mass number, but different atomic numbers.

For example:



Both have the same atomic mass, i.e., 40.

Question 14 ( 3.0 marks)

*Answer the following questions*.

(i) What discovery was made as a result of Rutherford’s alpha-particle scattering experiment?

(ii) Complete the table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name of element** | **Atomic no.** | **Atomic mass**  | **No. of electrons**  | **No. of protons**  | **No. of neutrons**  |
| \_\_\_\_\_\_\_ | 17 | \_\_\_\_\_\_\_\_ | ­­­\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_ | 20 |

Solution:

(i) Nucleus

(ii)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name of element** | **Atomic no.** | **Atomic mass**  | **No. of electrons**  | **No. of protons**  | **No. of neutrons**  |
| Chlorine | 17 | \_\_\_37\_\_ | \_\_17\_\_ | \_\_17\_\_ | 20 |

Question 15 ( 5.0 marks)

*Answer the following questions*.

(i) Name the factors responsible for the formation of soil.

(ii) Explain the importance of ozone.

(iii) Explain the importance of nitrogen-fixing bacteria. Where are they found?

Solution:

(i) The factors that influence the formation of soil are the sun, water, wind and living organisms such as lichens and mosses.

(ii) The ozone layer of the atmosphere absorbs the harmful ultraviolet radiations of the sun, and prevents them from reaching the earth’s surface.

(iii) Plants cannot utilise atmospheric nitrogen as such. Nitrogen-fixing bacteria convert atmospheric nitrogen molecules into nitrates and nitrites. These are then utilised by plants.

Nitrogen-fixing bacteria can be found in the roots nodules of leguminous plants. These nitrogen-fixing bacteria may also be free living.