CHEMISTRY

UNIT ONE: QUESTION AND ANSWER

1. **Where the words of science come from?**

The word science come from Latin word Sciatica that means Knowledge.

2. **Explain branches of science?**

- Social science: Focuses primarily on the study of people, culture and societies
- Formal science: concerned with formal system such as mathematics and logic.
- Natural science: is the science of physical word. Sub branch

3. **Explain sub branches of natural science?**

a) Life science: which science of living organism. Sub branch
   - Biology
   - Ecology

b) Earth science which is the science of earth. Its atmosphere and space. sub branch.
   - Geology
   - Meteorology
   - Astronomy

c) Physical science: which is the science that studies matter and energy and the. Physical

   - Physics
   - Chemistry

4. **Explain what scientific consist of?**

a) Making observation: the act of carefully and systematic examing of a scientific problem
b) Formulating hypothesis: making an educated guess based on a few know facts which has not yet been proved.
c) Designing experiments: a procedure that test hypothesis by the process of collecting information under controlled conditions.
d) Making conclusions.

5. **Define theory?**

A well test hypothesis that explains natural phenomena

6. **Define scientific law?**

Scientific law is statement that summarizes experimental results.

7. **Define chemistry?**

Chemistry is a branch of physical science that studies the composition, structure, properties and reaction of matter.

8. Describe matter?

Matter is anything that has mass and occupies space (volume).

9. What is called chemist?

The person who studies chemistry is known as chemist.

10. Why we study chemistry?

Chemistry is studied to understand what the natural world is made up and it works.

11. Why chemistry is called central science?

Because it is crucial to all other science

12. What are the main branches of chemistry?

a) Organic chemistry
b) Inorganic chemistry
c) Biochemistry
d) Physical chemistry
e) Analytical chemistry

13. Define

a) Organic chemistry; is the study of hydrocarbons (compound of carbon and hydrogen) and their derivatives
b) Inorganic chemistry: is the study elements and their compounds excluding hydrocarbons and their derivatives
c) Biochemistry: is the study of chemical processes that occur in living things.
d) Physical chemistry: is the study of properties and changes of matter and their relation to energy.
e) Analytical chemistry: is the study of qualitative identification and quantitative determination of the composition of matter.

14. Define laboratory?

Laboratory is specifically designed rooms where chemicals are stored and experiments are conduct.

15. Describe apparatus?

Apparatus are various tools and equipment used by scientist working in the laboratory.

16. Define safety tools and give example?

Safety tools are materials that are used to keep the lab setting safe.

Example lab coat and eye wash station.

17. Define measuring tools and give example?

Measuring tools are materials used to measure different measurements.

Example thermometer and beaker

18. Describe observing tools?

Observing tools are materials that allow you to have a look at substance and different materials.
Example: microscope and Petridis

19. Define heating tools and give example.
Heating tools are materials used in the process of heating.
Example: Bunsen burner and spirit lamp.

20. Define cutting tools and give example?
Cutting tools are materials that have sharp edge which can be penetrate or divide things.
Example: dissecting scissors and scalped
.

21. Define holding and grapping tools and give example?
Holding tools are materials that are used to keep things in the right position.
Grapping tools are materials used to transfer substance from one place to another.
Example: test tubes and test tube rock

22. Define filtering tools and give example?
Filtering tools are materials through which a fluid passes to separate out matter in suspensions.
Example: separating funnel and filter paper.

23. Define hazard signs?
Hazard signs are recognizable symbols designed to worm about hazardous or dangerous materials.

24. Define hazardous material?
Hazardous material any substance that can cause risk to public safety or environment

25. Define chemistry laboratory?
Chemistry laboratory: a laboratory for research in chemistry.

26. Define laboratory equipment?
Laboratory equipment is various tools and equipment used by scientist working in the laboratory.

CHOOSE THE CORRECT ANSWER

1) What are the main branches of natural science?

a) **Physical, life and earth**
b) Physical and chemical
c) Animal, plant and non-living things
d) Earth and astronomy

2) What branch of science does chemistry belong to?

a) **Physical science**
b) Life science
c) Earth science

d) Astronomy

3) Which of these is not a step of the scientific method?

a) Hypothesis
b) Experiment
c) Conclusion
a) instrumentation

4) A hypothesis is …..

a) A random thought
b) An answer
c) an educated guess
d) An experiment

5) What would you do to test a hypothesis?

a) guess
b) Create a spreadsheet with data
c) Publish a scientific paper
d) Design an experiment

6) What do we typically use to make observations?

a) Hypothesis
b) our five senses
c) Computer
d) Guessing

7) In which order would a student follow when using the scientific method?

a) Hypothesis, observation, analysis, conclusion
b) Observation, experimentation, hypothesis and conclusion
c) Observation, hypothesis, experimentation, conculation
d) Hypothesis, experimentation, conclusion, analysis

8) What kind of footwear is the best in the laboratory?

a) Shoes appropriate for the weather
b) open-toed shoes
c) **closed-toed shoes**
d) Sandals

9) You should never _____ chemicals in the lab.

a) Taste
b) Touch
c) Smell
d) all of the above

10) What do you think this symbol means?

a) Emergency eye wash station
b) Safety shower
c) Eye positive sprinkler system
d) Eye brush station

11) What does this safety symbol mean?

a) Harmless to trees and fish

b) Harmful to non-living things

c) Harmful to living things

d) Harmless to non-living.

CHAPTER TWO: QUESTION AND ANSWER.

1. **Define matter?**

Matter is defined as anything that has mass and occupies space.

2. **Define mass?**

Mass is a measure of the amount of matter in an object.

3. **What is measured by mass?**

Mass is usually measured in grams (g) or kilogram (kg).

4. **What is different between mass and weight?**

Mass is the amount of matter in an object, while
Weight is the measure of force acts upon that mass.

5. **Define weight?**

Weight is the measures of the amount of force acting on amass due to gravity.

6. **What is measured by weight?**

Weight is denoted by W and its measured in NEWTON (N).

7. **Classify mass and weight?**

Mass	Weight
1. mass of an object can never be zero	1. Weight of an object can be zero.
2. SI unit of mass is kg	2. SI unit of weight is Newton (N)
3. Its value is same every where	3. weight of an object changes from place to place.

8. **Define properties?**

The characteristics that enable us to distinguish one substance from another are called properties.

9. **Tell types of properties?**
   - Physical properties
   - Chemical properties.

10. **Define physical properties?**

Physical property is a characteristic of matter that is not associated with a change in its chemical composition.

11. What physical properties used for?

Physical properties are used to observe and describe matter.

12. List some examples of physical properties?

- Appearance
- Color
- Texture
- Adour
- Melting point
- Boiling point
- Density
- Solubility and many others.

13. What are the two kinds of physical properties?

a. Intensive properties
b. Extensive properties

14. What is an intensive property?

Intensive properties: these are physical properties which do not depend on the amount of substance present

15. What is extensive property?

Extensive properties: these are physical properties that depend on the amount of substance present

16. Tell some examples of extensive properties?

- Mass
- Volume
- Length
- Heat capacity etc.

17. What is physical change?

Physical change is a change in state or properties of matter without changing its chemical composition.

18. Tell examples of physical change?

Examples of physical change are melting, freezing or changing size or shape.

19. When physical change occurs?

A physical change occurs when the appearance of substance changes, but chemically the substance is the same.

20. What is a chemical property?

Chemical properties are properties that related to the reactions of substances that change its identity and new substance formed. Example; flammability, acidity and reactively

21. When chemical properties can be observed?

Chemical properties can only be observed when chemical change occurs.

22. What is chemical change?

States	Gas	Liquid	Solid
1.	Assumes the shape and volume of its container	Assumes the shape of its container	Retains a fixed volume and shape
2.	Compressible	Not easily compressible	Not easily compressible
3	Lots of free space between Particles	Little free space between particles	No free space between particles
4.	Randomly move	Flows easily	Does not flow easily

Chemical change is the change in which the identity and composition of the substance change and produces new substances.

23. Tell examples of chemical change?

Examples of chemical change are

- Burning woods
- Souring milk
- Digesting food
- Cooking an egg
- Heating sugar to form caramel.
- Baking a cake and resting of iron.

24. Define states of matter?

Te physical state of the substance is called state of matter.

25. List states of matter?

- Solid state
- Liquid state
- Gaseous state
- Plasma state
- Einstein Bose Condensate (EBC).
- Fermonic Condensate.

26. Compare gas, liquid and solid?

27. Define solid state?

Solid state have a definite volume and shape, the intermolecular force of attraction in solid matter is very strong.

28. Define liquid state?

Liquid state have a definite volume but not fixed shape, the intermolecular force of attraction in liquid is weaker than solid

29. Define gaseous state?

Gaseous state have neither definite volume nor shape, the intermolecular force of attraction for gaseous matter is negligible.

30. Define plasma state?

Plasma state is a state of matter that consists of super energetic and super exited particles in the form of ionized gases

31. Define Einstein Bose Condensate (EBC)?

Einstein Bose Condensate (EBC) is a theoretical state of matter, the intermolecular force of attraction for EBC is so strong that the molecules cannot move whatsoever.

32. Define Fermonic condensate?

Fermonic condensate is a super fluid phase formed by Fermonic particles at low temperature.

33. The volume of a gas can change but the volume of a solid cannot. Why?

Because solid particles are packed closely together the force between the particles are strong.

34. In which state (S) of matter are a toms when

a. Closest together
b. Farthest apart
c. Filling the container
d. Fixed in passion relative to one another.
e. Moving past one another
f. Taking on the shape of the container.

35. Define change of state?

The conversion of matter from one physical change to another is called change of state.

36. Define melting?

Melting is the process of changing a solid into liquid.

37. Describe melting point?

The temperature at which this change from solid to liquid accurse is called the melting point

Substance	**Melting point (**°C)	**Boling point (**°C)
Water	0	100
Table salt	804	1413
Iron	1535	2750
Aluminum	660	1800
Oxygen	-218	-183
Nitrogen	-210	-196

38. Define freezing?

Freezing is the process in which a liquid changes to solid.

39. Describe freezing point?

The temperature at which a specific liquid becomes a solid is called the freezing point.

At the temperature **below** the freezing or melting point the substance is a **solid**.
At the temperatures **above** the freezing or melting point the substance is a **liquid**.

40. Define evaporation?

Evaporation is the process by which a liquid changes into gas.

41. Define condensation?

Condensation is the process by which a gas changes its state to become a liquid.

42. Define sublimation?
The process by which a solid changes directly to a gas is called sublimation.

43. Define deposition?
The process by which a gas changes directly to solid is called deposition.

44. What change of state of matter and what energy changes occur when water freezes?
The change state of matter occurs when water freezes is freezing.
The energy changes occur when water freezes is energy out.

45. What happens if energy is added or removed from a glass of ice water?
If energy is added from glass of ice water will be happens evaporation.
If energy is removed from glass of ice water will be happens freezing

46. Explain how water can exist as both a solid and a liquid at 0°C?
At 0°C, water can exist as both solid and liquid. NOTE: At 0 °C temperature, after getting the heat equal to the latent heat of fusion, the solid form of water i.e., ice starts changing into its liquid form i.e., water.

47. <u>fill in the blank spaces</u>

a. The temperature at which a substance changes from solid to a liquid is the **melting point** at the substance.
b. The change of state of matter from a gas to a liquid is called **condensation**
c. The condensation point for a substance is the same as it temperature
d. For a substance to change from a gas to a liquid the particles must **energy out**
e. The change of sate of matter from solid to a gas is called **sublimation**
f. What two state of matter are found during "melting" **solid** and **liquid**
g. What two states of matter are found during evaporation? **gas** And **liquid**

<u>Choose the letter of the best answer</u>

1. Which of the following is an example of a physical property?
   a) **<u>Color</u>**
   b) Ability to rust
   c) Flammability
   d) Ability to combust
2. Which of the following is not a characteristic of a compound?
   a) Has different properties from the elements that formed it.
   b) <u>Pure substance made of two or more elements</u>
   c) Different samples with different properties
   d) Can be presented by a chemical formula
3. _____ Is an example of a homogenous mixture that is very evenly mixed?
   a) **<u>Sand</u>**

b) Chocolate chip cookies
c) Salad
d) Sugary water

4. The parts of a mixture
   a) Cannot be separated
   b) <u>Can be separated</u>
   c) Have new properties after they are mixed
   d) Form a chemical combination of two or more atoms.
5. Anything that has mass and take up space is an example of
   a) Energy
   b) Chemical change
   c) **<u>Matter</u>**
   d) Temperature
6. Which of the following is not true for atoms?
   a) <u>They are composed of molecules</u>
   b) They can combine with other atoms
   c) They make up elements
   d) They are extremely small.
7. A (n) _____of a pure substance can be observed without changing the substance.
   a) Chemical property
   b) Atom
   c) Element
   d) <u>Physical property</u>
8. A compound
   a) Is the same as a mixture
   b) Has the same properties as the elements it is made of
   c) **<u>Has a different property from the elements it is made of</u>**.
9. If you describe methane as a gas that easily catches fire, you are describing a
   a) Chemical formula
   b) <u>Chemical property</u>
   c) Physical property
   d) State of matter
10. New substances are always formed when matter undergoes a _____.
    a) Change in shape
    b) Physical change
    c) Change in temperature
    d) <u>Chemical change.</u>
11. Which of the following is an example of a chemical change?
    a) Melting butter
    b) Mixing milk and chocolate syrup
    c) Breaking a pencil
    d) <u>Burning a marsh wallow</u>
12. Which of the following is an example of heterogeneous mixture?
    a) Salt water
    b) Brass

c) Tomato soup

13. Substances that cannot be broken down chemically into other substance are
    a) Elements
    b) Compounds
    c) Mixtures
    d) Solutions

Answer the following questions

1. **What is the difference between mass and weight? Is the mass of an object on earth the same as in Jupiter? Why or why not?**

Mass is a measure of the amount of matter in an object.
Weight is the measure of the amount of force acting on mass due to gravity.

- Yes, because mass of an object is constant in all circumstances.

2. **Is it accurate to say that a substance with a mass of 1kg weight 2.2lb? Why or why not?**

Yes, if the object was weight at the same location in space

3. **What factor must be considered when reporting the weight of an object as opposed to its mass?**

When reporting the weight of an object it is important to note where this measurement was taken.

4. **Classify the following substance as homogeneous or homogeneous and explain your answer**
    a) **A carbonated beverage**= is homogeneous mixture
    b) **Muddy water** = is heterogeneous mixture
5. **Classify each substance as a pure substance or a mixture and explain your answer?**
    a) **Seawater** = is a mixture
    b) **Coffee** = is a mixture
    c) **Blood**= is a mixture **milk**= is a mixture
    d) **Distilled water**= is a pure substance.
6. **Read the statement below and identify whether a chemical or physical change is?**
    a) **Eating and digesting bread**= is a chemical change
    b) **Crumbling piece of paper**= is a physical change
    c) **Melting of ice**= is a physical change
    d) **A solid is crushed into powder**= is a physical change.
7. **Explain types of matter on basis of composition?**
    a. **Pure substance**: is a substance that is made up of one kind of materials.
    b. **Mixture:** is combination of two or more pure substance physically.

8. **Describe elements and compounds and give example each one?**
    a. **Elements**: are pure substances composed of only one kind of atoms.
        Example: gold (Au) and silver (Ag)
    b. **Compounds:** are two or more elements chemically combined in specific ratio
        Example: water (H_2O) and salt (NaCL)

9. **Describe homogeneous mixture and give example?**

Homogeneous mixture is a type of mixture that has a uniform appearance and composition

Example: salt water and sugar water

10. **Define heterogeneous mixture and give example?**

Heterogeneous mixture is a type of mixture that has different appearance and composition.

Example: water and sand & oil and vinegar

Chapter 3: Question and answer

Lesson magnetic separation

1. **Give an example of substance with no magnetic properties?**

The example of substance with no magnetic properties is pea.

2. **Give an example of solid-solid mixture?**

Sand+iron

3. **What types of mixtures is separated using magnetism?**

Solid-solid mixture

4. **Describe magnetic separation?**

Magnetic separation is a method used separation of mixture where one of the component of the mixture is magnetic material.

Lesson: separation by crystallization

1. **Why do we use crystallization in solutions?**

Because crystallization is used to produce solid crystals from a solution

2. **What kind of mixture can be separated by crystallizations?**

Solid-solid mixture

3. **What is the difference between evaporation and crystallization?**
   - **Evaporation**: when the solution is heated some of the solvent evaporates leaving behind a more concentrated solution.
   - **Crystallization**: is the formation of solid crystals from a liquid
4. **Explain the crystallization process?**

Crystallization is a method used to produce solid crystals.

Lesson: separation by filtration

1. **What kind of mixture can be separated by filtration?**

Insoluble solid from liquid

2. **What is the difference between decantation and filtration?**
   - **Filtration** is a process of separating mixture containing an insoluble component and liquid component by passing it through a filter paper or some other porous medium.
   - **Decantation** is a process to separate mixtures by removing a liquid layer that is free of precipitate or solids deposited from a solution
3. **Give an example for mixture that can be separated by filtration?**

Water+sand

4. **what separation technique can be used to separate heterogeneous mixture**
   - filtration

Lesson: separating of mixture by centrifugation

1. **What is principle behind centrifugation?**

The principle is that the denser particles are forced to the bottom and higher particles remains at the tops

2. **What types of mixtures are separated by using centrifugation?**

Solid-liquid mixture

3. **What is the difference between filtration and centrifugation?**
   - **Filtration**: the action or a process of filtering something
   - **Centrifugations**: is a separation process which uses the action of centrifugal force to promote accelerated setting of particles in solid-liquid mixture
4. **Define centrifugation?**

Centrifugation is a process of separating of insoluble material from liquid where normal filtration doesn't work well.

5. **What are the materials used in ghee production?**

Centrifuge

6. **What are the centrifuge consist of?**

The centrifuge consists of centrifuge tube and tube holder called Rotar.

Lesson: separation mixture by decantation.

1. **What kind of mixture can be separated by decantation?**

Insoluble solid from liquid

2. **What is the purpose behind decantation?**

The purpose may be to obtain a decant (liquid free from particles)

3. **Give an example of separation of mixtures based on decantation?**

Water+sand

4. **What is the relation between decantation and filtration?**

The relation between decantation and filtration is both to separate insoluble solid from liquid.

5. **Describe decantation**

Decantation is a process to separate mixtures by removing a liquid layer that is free of precipitate or solids deposited from a solution

Lesson: separation mixture by evaporation

1. **Explain the difference between solute and solvent?**
    a. **Solute**: the solid which dissolve in solvent
    b. **Solvent**: the liquid which dissolve the solid
2. **Define evaporation?**

Evaporation is the process by which liquid changes into gas

3. **What kind of mixture can be separated by evaporation?**

Soluble solid from liquid

4. **Explain the principle involved in the separation of salt and water**

The solid component is non-volatile while the liquid is easily evaporable

5. **Explain the principle involved in drying wet clothes?**

Centrifugation is used in washing mechanics to squeeze out water from wet cloth

Lesson: separation mixture by distillation

1. **What type of mixture is separated by simple distillation?**

Simple distillation is used to separate a solvent from a solution

2. **Define distillation?**

Distillation is separation technique used to separate component of liquid mixture by a process of heating and cooling which exploits the difference in the volatility of each of the components

3. **If you want to separate salt from salt from salty water mixture what separation method would you use and why?**

Evaporation, because is a technique used to separate out homogeneous mixtures that contains one or more dissolved salts

4. **Define simple distillation?**

Simple distillation is used to separate a solvent from a solution

Lesson: separation of mixture by separating funnel.

1. **Identify the type of substances (solid, liquid or gas) that are mixed in the separating funnel?**

Liquid mixture

2. **Explain how o you use a separating funnel?**

The mixture is poured into the funnel and the layers allowed to separate, the blue (water) liquid is denser than the oil and so sinks to the bottom of the separating funnel.

3. **Name three liquids which are miscible and three for immiscible?**

Miscible liquids	Immiscible liquids
Milk coffee	Gasoline (petrol) and water
Acetic acid and water	Wax and water
Lemonade	Kerosene and water

4. **Have you ever put on sesame oil into your milk? What did you observe?**

No

5. **What is the difference between miscible and immiscible liquids?**
   a) **Miscible liquids:** the liquids that dissolve in each other in all proportions are called miscible liquids
   b) **Immiscible liquids:** the liquids that are not soluble in any liquids are called immiscible liquids.
6. **Define funnel separation?**

Funnel separation is a method of separation two immiscible liquids.

Lesson: fractional distillation method

1. Give an example of a mixture that can be separated by fractional distillation?

Ethonal+water

2. What kind of mixture can be separated by fractional distillation?

Two miscible liquids

3. Describe fractional distillation?

Fractional distillation is a method of separating two miscible liquids which different boiling point.

4. What is distillation?

Distillation is separation technique used to separate component of a liquid mixture by a process of heating and cooling which exploits the difference in the volatility of each of the component.

Lesson: separating gases from air

1. Define liquefaction?

Liquefaction: the process of making or becoming liquid of air.

2. How is air covered to liquid?

Air is covered to liquid by cooling it to about -200°C at normal atmospheric pressure

3. Which technique do you think we can use for obtaining different components from air?

Fractional is distillation

4. Define air?

Air is homogeneous mixture of gases

Choose the correct answer for the following questions:-

1) What physical property is used to determine what component will separate out during the process of fractional distillation?

a. Density
b. Melting point
c. **boiling point**
d. Sample value

2) which of the following is a process used to produce petrol from crude oil?

a) Filtration
b) **fractional distillation**
c) Evaporation
d) Decanting

3) What is the correct order for obtaining salt from a mixture of sand and water?

a) **Dissolving in water, filtration, evaporation**

b) Evaporation, filtration, dissolving in water
c) Filtration, dissolving in water, evaporation

4) In the process of evaporation, which of the following pieces of laboratory apparatus would not be used?

a. Filter paper
b. Bunsen burner
c. **evaporating basin**
a. Wire gauze

5) Which physical property is used to separate iron granules from dust particles?

a) **Magnetic**
b) Electric
c) Density
d) Filtration

CHAPTER 4: QUESTION AND ANSWER

1. **Define Element?**
   - **Element** is a Pure Substance that Can Not be Chemically Broken Down Into Similar Substance.

2. **How Many Elements Are These?**
   - There Are 118 Known Elements

3. **What Are Classification Of Elements?**
   - Metal, Non-Metal and Metalloids.

4. **What Is The Atom?**
   - Atom Is The Smallest Particle Of An Element That Can Take Part Any Chemical Reaction.

5. **How many elements are there non-metals?**
   - 17elements

6. **How can you determine that an element is a metal, non-metal or metalloid?**
   - The metals are to the left of the line (except for hydrogen, which is a nonmetal), the nonmetals are to the right of the line, and the elements immediately adjacent to the line are the metalloids

7. **What Are Two Properties That Make A Metal A good Choice To Use A Wire?**
   - It Is A Good Conductor Of Heat And Electricity.
   - It Has High Boiling And Melting Point.

8. **Why gold is preferred for making jeweler?**
   - Gold is preferred in making jewelry because it does not react with atmospheric moisture and rust.

9. **Why Are Metalloids Called Semi Metal?**
   - Elements Containing Properties Similar and Mid Way between Metal and Non-Metal

10. **Identify The Following Elements As Metals , Non-Metals Or Metalloids : A)Silicon B)Fluorine C)Uranium D)Mercury E) Arsenic F)Iridium** ➢

Metals	Non-Metals	Metalloids
Uranium	Fluorine	Silicon
Iridium		Arsenic

11. **Use the periodic table of elements to explore two elements (not listed in the lesson) with the name of a country and two other elements (not listed in the lesson) with the name of a scientist.**

Element	Country	Element	Scientists
a. Francium	(France)	a. Nobelium	Alfred Nobel, the inventor of dynamite and founder of the Nobel Prize
b.nihonium	(Japan or Nihon)	b.Fermium:	Enrico Fermi, the inventor of the first nuclear reactor

12. **Explain how some elements got their names?**

- New elements can **be named after a mythological concept**, a mineral, a place or country, a property or a scientist. ... "The most recent tradition has been to name them after places or after people." The places chosen tend to be where the element was discovered or first manufactured

13. **Why symbols of elements are used?**

- Symbols are **used to standardize the 'language of chemistry'** and to identify elements and atoms in a chemical formula easily.

14. **Correct These Symbols And Write Their Name :**

A) MN B) Ca C) PB D)Cr E)Al

- Mn=Manganese
- Ca =Calcium
- Pb = Lead
- Cr=Chromium
- Al= Aluminum

15. **What Is Symbol?**

- Symbol Is the Chemical Representation Of Elements.

16. **Distinguish between Ion and Ionization?**

- Ion When Atoms Lose Or Gain Electrons They Form Ion.
- Ionization Any Process That Creates An Ion Is Referred to As Ionization.

17. **What Are Types Of Ions?**

- Cat ion And Anion

18. **Classify Each Of The Following As Atom Or Ion**

Mg, Na^{+}, Cl^{-}, K, Ca^{+2}, O^{-2}, P^{-3}, Al^{+3}, Ba and Ba^{+2}

-

Atom	Ion
Mg, K And Ba	Na^{+} ,Cl^{-}, Ca^{+2}, O^{-2},P^{-3},Al^{+3} And Ba^{+2}

19. **Magnesium Atom Loses Two Electrons When They React, Write the Symbol of the Ion that Formed Is It Cat ion And Ion?**
    - Mg^{+2}
    - It is a Cat ion

20. **Oxygen Atom Gain Two Electrons When They React Write the Symbol Of The Ion That Formed Is It Cat ion Or Anion?**
    - O^{-2}
    - Anion

21. **Name The Following Ions**

A) Se^{-2} B) Sn^{+2} C) Au^{+}.

a) Se^{-2} = Selenide
b) Sn^{+2} = Tin Ion
c) Au^{+2}=Gold Ion

22. **Write the symbols of the following ions**

a. Lead (lv) ion
b. Plumbous
c. Thiosulfate

Solution

a) Pb^{+4}
b) Pb
c) $S_2O_{3}^{-2}$

23. **Explain the difference between mono atomic and poly atomic ions.?**
    - polyatomic ions are ions that contain more than one atom
    - mono atomic ions are ions that contain only one atom

24. **Write the symbol and valance of the following ions**

a. Phosphate
b. Chlorate
c. Hydroxide
d. Carbonate
e. Ammonium

SOLUTION

a) PO_3^{-3} ∴ its valence is -3

b) $ClO^{-}{}_3^{-}$ ∴ its valence is -1

c) OH ∴ its valence is -1

d) CO_3^{-2} ∴its valence is -2

e) NH_4^{+1} ∴ its valence is $+1$

25. **Write the symbol and valence of each of the following elements**

a. Rubidium
b. Radium
c. Gallium
d. Carbonate
e. Selenium

Solution

Element	Symbol	Valence
a)Rubidium	Rb	+1
b)Radium	Ra	3
c)Gallium	Ga	3
d)Carbonate	$CO_3{-}2$	-2
e)Selenium	Se	-2

26) What Is Difference Between Molecule And Compound?

- Molecules Contain Two Or More Similar Elements
- Compounds Contain At Least Two Different Elements

27) **Explain Why All Compounds Are Molecules But Not All Molecules Are Compounds**

- Because A Molecule Can Be Made Up Of two Atoms of the Same Kind

28) **What Are The Different Types Of Molecules**?

- Molecules Of Element
- Molecules Of Compound.

29) **How Are Molecules Formed?**

➢ Molecules Are formed either by the combination of atoms of the same of different elements

30. **Is O_2 a Compound Or Molecule?**

➢ O_2 is molecule

31. **Define A) Molecule B) Atomicity**

➢ A) Molecule Is a Group of Two or More Atoms Chemically Bonded Together

➢ B) Atomicity Is the total Number Of Atoms Present In Molecule.

32) Which Of the Following Is Compound?

A) Co

b) C

c) Br_2

d) **CO_2**

33) How many atoms of each element are in $Ca(N0_3)_2$?

➢ 1atom of calcium, 2atom of nitrogen and 6atoms of oxygen

34) How many (Al) atoms are in the compound $AIC1_3$?

➢ 1 atom of aluminum

35) **Write the name of each element in $ZnsiO_4$?**

➢ Zn= zinc

➢ Si= silicon

➢ O_4= oxygen

36) **What is the total number of atoms in $Zn(MnO_4)_2$**

➢ 11Atom

37) **What is the total number of elements in NH_4NO_3?**

➢ 9atom

38) **Write the formula of the following chemical Compounds**

a. Sodium bicarbonate

b. Potassium nitrate

c. Carbon dioxide

d. Water

SOLUTION

a) $NaHCO_3$

b) KNO_3

c) CO_2

d) H_2O

39) **Fill in the missing information to give the correct formula for each compound**

a) $N_a?SO_4$
b) $B_a?(PO_4)?$
c) Al?(OH)?

SOLUTION

a) Na_2SO_4
b) $Ba_3(PO_4)_2$
c) $Al(OH)_3$

40) **Write the formula of the following chemical Compounds**

a. Nitrogen tribromide
b. Sulfur trioxide
c. Oxygen difluoride
d. Dinitrogen trifluoride

SOLUTION

a. NBr_3
b. SO_3
c. OF_2
d. N_2F_3

41) **What IUPAC stand for?**

- International Union Pure and Applied Chemistry

42) What are types of ions on basis on type of ions?

- **Cat ion**
- **Anion**

43) **What are types of ions on basis on number of toms?**

- Monoatomic
- Polyatomic ion

44) **Distinguish between each of**

A) Atom and ion B) polyatomic ion and mono atomic ion C) cat ion and anion

- **Atom** is the smallest part of an element that can take part any chemical reaction
- **Ion** is when an atom loses or gains electrons **b)**
- polyatomic ions are ions that contain more than one atom
- mono atomic ions are ions that contain only one atom **c)**
- Cat ion are the positively charged ions formed usually when metals loses electrons
- Anions are negatively charged ions ,they formed usually when non metals gains electrons

45) What is the difference between atoms and element?

❖ Atom is the smallest particular of an element

❖ Is pure substance that cannot be broken down

46) Define valence?

- Is the number of electrons lost, gained or shared by the atom

47) What are types of valence? Define each one?

- Electrovalence is the number of electrons lost or gained by an atom
- Covalence is the number of shared electrons between atoms

48) Define chemical formula?

- Is the chemical representation of a molecule

49) Name the names of the following chemical formulas

a. $SO_2 \rightarrow SulfurDioxide$

b. $BF_3 \rightarrow BoronTriflouride$

c. $Be(OH)_2 \rightarrow Berylliumhydroxide$

d. $Cr_2O_3 \rightarrow ChromiumOxide$

50) Write the chemical formulas of the following chemical names

a. Ammonium phosphate→

b. Sodium carbonate

c. Gold (Ill) iodide

d. Manganese (VII) oxide

Answers

a) $(NH_4)_3PO_4$

b) Na_2CO_3

c) AuI_2

CHAPTER REVIEW QUESTIONS

1. **What is the difference between atoms and molecules?**
   a. **Atoms:** is the smallest particle of an element
   b. **Molecules:** is defined as a group of two or more atoms chemically bonded together
2. **Why are elements classified into metals, non-metals and metalloids?**

Based on their chemical and physical properties like malleability, ductility, conductance and reactivity

3. **What is the difference between chemical symbol and chemical formula? Give example for each of them?**
   a. **Chemical symbol**: are the abbreviation used in chemistry for chemical element

Example: He

b. **Chemical formula**: is the chemical representation of molecules

Example: NH_3

4. **List the symbols for the following elements: iron, sodium, antimony, tungsten. Explain why these symbols do not correspond to the English names of the elements**

No	elements	symbols
1.	Iron	Fe
2.	Sodium	Na
3.	Antimony	Sb
4.	Tungsten	W

5. **What is difference between the following pairs**

a. Atom and ion

- **Atom:** is the smallest particle of an element
- **Ions:** are atoms or group of atoms charged positively or negatively

b. Polyatomic ion and mono-atomic ion

- **Polyatomic ion:** "poly" means many, polyatomic are identifies as ions that contain more than one atom
- **Monatomic ions:** "mono" means one, monatomic ions are defined as ions that contain only one atom

c. Cat ion and anion

- **Cat ion:** are positively charged ions
- **Anions:** are negatively charged ions

6. **Write the formula for the following chemical names**

Chemical named	**Formula**
a. Sodium bicarbonate	$NHCO_3$
b. Sodium fluoride	NaF
c. Iron (III) chloride	$FeCl_3$
d. Sodium carbonate	Na_2CO_3
e. Copper (II) sulfate	$CuSO_4$
f. Magnesium hydroxide	$Mg(OH)_2$
g. Barium nitrate	$Ba(NO_3)_2$
h. Lithium sulfate	Li_2SO_4
i. Magnesium chloride	$MgCl_3$
j. silver nitrate	$AgNO_3$

7. **write the names of the following chemical formulas**

Chemical formulas	**Chemical names**
a. NaCl	Sodium chloride

b. $Fe_2(CO_3)_3$	Iron (III) carbonate
c. $Cu(OH)_2$	Copper (II) hydroxide
d. $(NH_4)_2SO_4$	Ammonium sulfate
e. $LiNO_3$	Lithium nitrate
f. $BaSO_4$	Barium sulfate
g. $Mg(NO_3)_2$	Magnesium nitrate
h. AgCl	Silver (I) chloride
i. $Al(OH)_3$	Aluminum hydroxide
j. $CaSO_4$	Calcium sulfate
k. FeS	Iron (II) sulfide
l. $FeCl_3$	Iron (III) chloride
m. NaI	Sodium Iodine
n. $MgCO_3$	Magnesium carbonate

8. **Define valency?**

Valency is defined as the number of electrons lost or gained or shared by the atom

9. **How is the valency of elements determined?**

An elements valency is determined by the number of electrons in its outer shell

10. **Write the valency of each of the following elements**

Elements	Valency
a. Li	1
b. Ba	2
c. Al	3
d. Fe	2,3
e. Mn	7,4,2

11. **How are the valencies of ions determined?**

The valency of ions is determined by the number of outer shell (valence electrons)

12. **Write the valency of the following ions**

Ions	Valency
a. Sr^{+2}	2
b. CL^{-}	1
c. SO^{-2}_4	2
d. PO_3^{-3}	3

CHOOSE THE CORRECT ANSWER

13. Chemical formula of Zinc Hydroxide is

a. $Zn(OH)_2$

b. ZNO_2

c. $Zn_2(OH)_3$

d. ZnOH

14. All of these radicals have a valency of 2 except
    a. SO_4
    b. CO_3
    c. NH_4
    d. $MgCO_3$
15. In CuO (Copper Oxide), valency of copper is
    a. +1
    b. +2
    c. -1
    d. -2
16. Formula of Ammonium Sulfate is
    a. $NH_4(SO_4)^2$
    b. $NH_4(HSO_4)^2$
    c. $(NH_4)_2SO_4$
    d. $(NH_3)_2SO_3$

CHAPTER 5: QUESTION AND ANSWER

Answer the following questions

1) Why is an atom electrically neutral?

Ans: if an atom contains equal numbers of protons and electrons, the atom is described as being electrically neutral.

2) What are the charges for each of the three subatomic particles?

Ans: Proton (+1 charge), neutron (0 charge) and Electron (-1 charge)

3) Define an isotope and give an example?

Ans: Isotopes are elements that have same atomic number but different mass number. Example, $_6{}^{12}C$ and $_6{}^{14}C$

4) Give complete symbols of each atom, including the atomic number and the mass number.

a) An oxygen atom with 8 protons and 8 neutrons= $_8{}^{16}\mathbf{O}$

b) A potassium atom with 19 protons and 20 neutrons= $_{19}{}^{39}\mathbf{K}$

c) A lithium atom with 3p protons and 4 neutrons= $_3{}^{7}\mathbf{Li}$

5) Fill the following table

Element	Symbol	Number of Protons	Number of electrons	Number of neutrons	Mass number
Carbon	C	6	6	6	**12**
Oxygen	O	8	8		16
Fluorine	F	9		10	19
Magnesium	Mg	**12**	12	12	24
Calcium	**Ca**	20	20	20	40
Zinc	Zn	30	30	35	**65**

6) What is a shell? How many electrons can be accommodated in L-shell?

Ans: In an atom the electrons move around the nucleus in an orbit called shells or energy level.

L= 8 electrons

7) Rubidium has two isotopes. 85Rb has mass of 84.9117amu and 87Rb has mass of 86.9085amu. If the average atomic mass of Rb is 85.4678amu, what is the atomic abundance of each isotope?

Ans:85Rb m1= 84.9117amu **p1=** 72.15%

87Rb m2= 86.9085amu **p2=** 27.85%

8) Write the valence electron configuration for each of the elements below.

a) $_{3}$Li= **2,1**

b) $_{4}$Be= **2,2**

c) $_{9}$F= **2,7**

d) $_{10}$Ne= **2,8**

e) $_{37}$Rb= **2,8,18,8,1**

f) $_{38}$Sr= **2,8,18,8,2**

g) $_{53}$I= **2,8,18,18,7**

h) $_{54}$Xe= **2,8,18,18,8**

9) How can you predict the arrangements of electrons using the 3 rules?

Ans: This arrangement of electrons in the atom can be predicted by applying these rules:

a) Aufbau principle

b) pauli exclusion principle

c) Hund's rule

Multiple choice questions

1) Who is credited with the discovery of electron?

a) JJ Thomson
b) James chadwick
c) Ernest Rutherford
d) Niels Bohr

2)An atom has a mass number of 37 and atomic number 17. How many protons does it have?

a. 20
b. 17
c. 54
d. 21

3)What would be the atomic number of the element in whose atom the K and L shells are full?

a. 10
b. 12
c. 14
d. 16

4) The isotopes of neutral atoms of an element differ in

a. Atomic number
b. Mass number
c. Number of electrons
d. Chemical properties

5) The electronic configuration of an atom having atomic number 20 is

a. 2,8,8,2
b. 2,8,10
c. 2,6,8,4
d. 2,4,8,6

6) Almost the entire mass of an atom is concentrated in the

a) Proton
b) Electron
c) **Nucleus**
d) Neutrons

7) The atomic theory of matter was first proposed by

a. John Dalton
b. Rutherfold
c. JJ Thomson
d. Niels Bohr

8) An ion with 5 protons, 6 neutrons and a charge of 3+ has an atomic number of ____

a. 5
b. 6
c. 8
d. 11

9) What is the mass number of an atom which contains 28 protons, 28 electrons and 34 neutrons?

a. 28
b. 56
c. **62**
d. 90

10) Find the electron configuration of potassium (K), z= 19?

a. 2,8,8,4
b. 2,8,8,1
c. 2,8,7
d. 2,8,8,3

11) For the sulfur isotopes, $^{32}_{16}S$ and $^{34}_{16}S$, what are the number of

a. Protons, S1= 16 S2= 16
b. Nucleons S1= 32 S2= 34
c. ElectronsS1= 16 S2= 16
d. Neutrons S1= 16 S2= 18

12) Which of the following isotopes of 35Cl?

a. $^{17}_{35}{}^{35}_{3517}Cl$
b. $^{35}_{17}Cl$
c. $^{37}_{17}Cl$

13) Which of the following are isotopes of U-235? (X represents an element symbol)

a) $_{92}{}^{235}X$
b) $_{90}{}^{238}X$
c) $_{92}{}^{235}X$

14) Which pair represents isotopes?

a) $_{2}{}^{4}He$ and $_{2}{}^{3}He$

b) $_{26}{}^{56}Fe$ and $^{56}_{25}M$

c) $^{28}_{14}S$ and $^{31}_{16}P$

Chapter 6: question and answer

1) Justify the position of Hydrogen in the periodic table?

Ans: Hydrogen is the first element on the periodic table.

2) What is the composition of water gas?

Ans: The composition of water gas is a mixture of carbon monoxide and hydrogen.

3) Why is ice less dense than water?

Ans:ice actually has a very different structure than liquid water, in that the molecules align themselves in a regular lattice rather than more randomly as in the liquid form. It happens that the lattice arrangement allows water

molecules to be more spread out than in a liquid and thus, ice is less dense than water.

4) A completely full bottle of boiling water is placed in the freezer. Discuss what happens as the water cools and eventually freezes.

Ans: During freezing, water molecules loss energy and do not vibrate or move around as vigorously. This allows more stable hydrogen bonds to form between water molecules, as there is less energy to break the bonds, thus water expands as it freezes and ice floats stop water.

5) List the unique properties of water.

Ans:water is polar, solvent, has high heat capacity, has high heat of vaporization and water is less dense as a solid than as a liquid.

6)Why should water really be a liquid in a room temperature and not a gas?

Ans: At room temperature, water is found in a liquid state, due to the presence of hydrogen bonds.

7) Which is the most abundant element in the universe?

Ans: Hydrogen is the most abundant element in the universe

8) Which isotope of Hydrogen is radioactive?

Ans: Tritium it is radioactive in nature

9) What causes temporary hardness of water?

Ans: Temporary hardness is primarily due to the presence of soluble bicarbonates of magnesium and calcium.

10) What causes permanent hardness of water?

Ans: permanent hardness of water is due to the presence of soluble salts of magnesium and calcium in the form of chlorides and sulphates in it.

11) Write the names of isotopes of Hydrogen and state the percentage abundance of each isotope.

Ans: a) Protium: the most abundant form of hydrogen with a percentage composition of 99.985%

b) Deuterium: it constitutes 0.015% of total hydrogen in nature

c) Tritium: very small trace amounts

12) Why does Hydrogen occur in a diatomic form rather than in a mono-atomic form under normal conditions?

Ans: Hydrogen has one electron less than the stable inert gas configuration and therefore it shares its single electron with an electron of another hydrogen atom to form stable diatomic molecules

13) Describe the preparation of Hydrogen by electrolytic method.

Ans: on passing an electric current, water is decomposed into hydrogen and oxygen. Hydrogen is collected at the cathode while oxygen is collected at the anode.

14) What makes water different from other types of liquids?

Ans: Because water molecules are polar, they are more attracted to molecules that are also polar or that have a charge (like an ion).

Because of density difference between water and oil, this means that they form two separate liquid layer.

15) How much of the earth's surface is covered by water?

Ans: 71 percentage of the earth's surface is water covered

16) Compare the difference between H_2O and H_2O_2.

Ans: Hydrogen peroxide has 1 more oxygen than water, water has 2 hydrogen atoms and 1 oxygen atom and hydrogen peroxide has 2 hydrogen atoms and 2 oxygen atoms