



## Chapter ( 1 )

### 1- Write the scientific term :

1. Simple symbolic formula represents number and type of atoms
2. Formula which represents the ratio between elements of the compound .
3. Molecular mass expressed in grams .
4. A chemical compound which contains one mole of chloride ion and one mole of potassium ion
5. Sum of atomic masses in the molecule .

### 2- Balance the following equations :

- 1)  $\text{Na} + \text{Cl}_2 \longrightarrow \text{NaCl}$
- 2)  $\text{K} + \text{Br}_2 \longrightarrow \text{KBr}$
- 3)  $\text{Cu CO}_3 \longrightarrow \text{CuO} + \text{CO}_2$
- 4)  $\text{Al} + \text{Fe}_2 \text{O} \longrightarrow \text{Al}_2 \text{O}_3 + \text{Fe}$
- 5)  $\text{Mg} + \text{N}_2 \longrightarrow \text{Mg N}_2$
- 6)  $\text{Ca} + \text{Al Cl}_3 \longrightarrow \text{Ca Cl}_2 + \text{Al}$
- 7)  $\text{Ca ( OH )}_2 + \text{HCl} \longrightarrow \text{Ca Cl}_2 + \text{H}_2 \text{O}$
- 8)  $\text{C}_2 \text{H}_5 \text{OH} + \text{O} \longrightarrow \text{CO}_2 + \text{H}_2 \text{O}$
- 8)  $\text{Na} + \text{H}_2 \text{O} \longrightarrow \text{Na OH} + \text{H}_2$
- 9)  $\text{H}_2 \text{SO}_4 + \text{Na OH} \longrightarrow \text{Na}_2 \text{SO}_4 + \text{H}_2 \text{O}$
- 10)  $\text{Ca O} + \text{HCl} \longrightarrow \text{Ca Cl}_2 + \text{H}_2 \text{O}$
- 11)  $\text{Ca ( OH )}_2 + \text{CO}_2 \longrightarrow \text{Ca CO}_3 + \text{H}_2 \text{O}$

### 3- Complete each of the following :

1. The molecular formula represents ..... , .....and .....
2. 1 mole of calcium , 2 moles of oxygen and 2 moles of hydrogen from one mole of .....

3. .... = the empirical formula  $\times$  No. of units of empirical formula .
4. The .....formula represents the No. of moles of each element in the compound .
5. The .....formula represents the ratio between the elements of the compound .
6. Number of moles =  $\frac{\text{.....}}{\text{.....}}$
7. 1 mole of aluminum oxide  $\text{Al}_2\text{O}_3$  contains .....moles of aluminum ion and ..... mole of oxygen ions .
8.  $\text{AgNO}_3 + \text{NaCl} \longrightarrow \text{.....} + \text{.....}$ , this reaction is called .....
9. 1 mole of any compound contains number of atoms or molecules or ions called ..... which equals .....
10. 1 mole of aluminum contains .....atoms of aluminum .

**4- Change the following word equations into balanced symbolic chemical equations showing the physical state and conditions of the reaction if needed :**

1. Magnesium + sulphuric acid  $\longrightarrow$  Magnesium sulphate + Hydrogen
2. Zinc + copper sulphate  $\longrightarrow$  Zinc sulphate + copper
3. Sodium + copper sulphate  $\longrightarrow$  sodium sulphate + copper
4. Nitric oxide + oxygen  $\longrightarrow$  Nitrogen dioxide

**5- Calculate the chemical formula for magnesium oxide produced on heating 0.24 gm of magnesium, the mass of magnesium oxide produced 0.4 gm where ( Mg = 24 ; oxygen = 16 )**

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**6- When 0.62 gm of phosphorous react with 0.8 gm of oxygen to produce phosphorous pentaoxide. calculate its molecular formula where ( P = 31 & O = 16 )**

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**7. Write the molecular formula of a compound , its molecular mass 26 gms , its empirical formula is CH**

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**8. Write the molecular formula of a compound its molecular mass is 16 gms . its empirical formula  $\text{CH}_4$  .**  
**(C= 12 & H = 1 )**

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**9. Write the molecular formula of an organic acid its empirical formula  $\text{CH}_2\text{O}$  & its molecular mass 90 gm .**  
**( C= 12 , H = 1 , O = 16 )**

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**10. Write the molecular formula of an organic compound , its mass = 108 gms & its empirical formula is  $\text{C}_2\text{H}_3$  .**

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**11. Find the empirical formula for an organic compound which consists of ( 80 % carbon & 20 % hydrogen ) if its molecular mass 30 then .Find its molecular formula ( C= 12 , H = 1 )**

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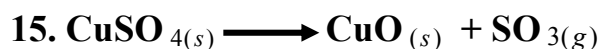
**12. Find the empirical formula for an organic compound composed of 25 % of ( H ) & 75 % of carbon .**  
**(H = 1 , C = 12 )**

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**13. Calculate the mass of calcium oxide produced from the reaction of 10 gm calcium when it is burnt completely in air where (ca = 40 & O = 16 gm / mole )**  
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**Calculate the mass of Magnesium oxide produced on the thermal decomposition of 21 gm of  $\text{Mg CO}_3$  . Where ( Mg = 24 & C = 12 & O = 16 )**  
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**Calculate the mass of copper oxide produced on thermal decomposition of 15.95 gm of copper sulphate . ( Cu = 63.5 , S = 32 , O = 16 )**  
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**16. Calculate the mass of Zinc chloride  $\text{ZnCl}_2$  produced from the reaction 32.5 gm of Zinc with hydrochloric acid . Where ( Cl = 35.5 , Zn = 65 )**  
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**17. Calculate the chemical formula for calcium oxide produced on heating 0.4 gm of calcium , the mass of calcium oxide produced 0.56 gm ( Ca = 40 , O = 16 )**  
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## Chapter ( 2 )

**1. Choose the correct answer :**

1. Gold alloy is considered as one of .....solution  
a. solid                                  b. liquid                                  c. gaseous
2. ....is an example of colloidal solutions  
a. sugar in water                  b. chalk in water                  c. Milk and blood                  d. salt in water
3. Oxygen in nitrogen is considered as one of .....solutions  
a. solid in liquid                  b. liquid in liquid                  c. gas in liquid                  d. gas in gas
4. Water molecule consists of .....  
a. two hydrogen atoms and one oxygen atom                  b. hydrogen atom and one oxygen atom  
c. two oxygen atoms and hydrogen atom                  d. two hydrogen atoms and two oxygen atoms
5. Alcohol in water is a .....solution .  
a. gas in liquid                      b. solid in liquid                      c. liquid in liquid                      d. gas in solid
6. Solutions can be divided according to the kind of solvent into .....  
a. solid solutions                      b. liquid solutions                      c. gaseous solutions                      d. a , band c
- 7.Hydrogen chloride in water represents a .....solution .  
a. solid in liquid                      b. gas in liquid                      c. liquid in liquid                      d. gas in gas
8. Sugar solution in water is considered a .....solution .  
a. colloidal                              b. suspension                              c. true
9. ....is colloidal solution .  
a. chalk in water                      b. milk and blood                      c. sugar in water
10. Fats can be dissolved in .....  
a. water                                  b. aromatic benzene                      c. nitric acid                      d. sulphuric acid
11. The ratio of hydrogen in water represents .....by weight  
a.88.8 %                                  b. 20 %                                  c. 11.2 %                                  d. 70 %
12. The active metals react with acids to form salt of acid and .....gas evolves  
a. oxygen                                  b. hydrogen                                  c. Nitrogen                                  d. Ammonia
13. When acid reacts with metal carbonate or bicarbonate , a gas evolves which is characterized by .....  
a. Irritating odour                      b. Has reddish brown colour

c. It burns with a pop in air                      d. Turbids the lime water

14. When copper oxide (II) dissolves into sulphuric acid, it produces a salt solution which is ....

- a. copper sulphate (II)                      b. Copper sulphate (I)  
c. Copper sulphite (II)                      d. Copper sulphate (III)

15. On adding sodium hydroxide solution onto a salt solution of iron (III), a .....precipitate is formed .

- a. Black                      b. Reddish brown                      c. Blue                      d. white

16. On passing carbon dioxide gas into sodium hydroxide solution and the solution is left to cool, it forms crystals of .....

- a. Anhydrous sodium carbonate                      b. washing soda  
c. sodium bicarbonate                      d. Sodium sulphate

17. Sulphuric acid is .....

- a. organic acid                      b. Mineral acid                      c. weak acid                      d. Monobasic acid

18. Acids .....

- a. have smooth feel in touch  
b. change the blue colour of the litmus paper into red .  
c. give (OH ) ions when dissolving in water .  
d. have burn effect on skin

19. Bases .....

- a. change red colour of the litmus paper into blue  
b. have burn effect on skin  
c. smooth in touch  
d. All the previous answers

20. On adding sodium hydroxide to ammonium salts with gently heating, .....gas evolves .

- a. hydrogen chloride                      b. hydrogen                      c. ammonia

21. On exposing ammonia gas to a glass rod wet with hydrochloric acid, .....fumes are formed .

- a. Reddish brown                      b. blue                      c. white                      d. black

22. On adding sodium hydroxide solution to copper sulphate, a .....precipitate is formed

- a. blue                      b. white                      c. black                      d. reddish brown

23. From alkalis .....

- a. lemon juice                      b. vinegar                      c. caustic soda

24. On adding sodium hydroxide solution to iron (III) chloride, a .....precipitate is formed .

- a. blue                                  b. Reddish brown                  c. Black                              d. white
25. On neutralization between acid and alkali ,.....is used for titration the acid
- a. Burette                              b. pipette                              c. graduated jar                      d. conical flask
26. Acid react with active metals and .....are formed
- a. Acid salt and water    b. Acid salt , water and carbon dioxide  
c. Acid and hydrogen gas evolves                              d. Acid salt and oxygen gas evolves
27. From mineral acids is .....
- a. hydrochloride acid                      b. Nitric acid                      c. sulphuric acid                      d. all the previous
28. Sulphuric acid and oxalic acid are .....acids
- a. monobasic                              b. dibasic                              c. tribasic
29. From strong acids is .....
- a. hydrochloric acid                      b. acetic acid                      c. carbonic acid                      d. all the previous
30. Sulphuric acid is prepared in industry by dissolving .....in water
- a. sulphur monoxide                      b. sulphur dioxide                      c. sulphur trioxide                      d. sulphate

## 2. Write the scientific term :-

1. A molecule is composed of one atom of oxygen and two atoms of hydrogen .
2. Attraction between hydrogen atoms and oxygen atoms in water molecules .
3. It is a homogeneous mixture composed of two or more components which are not united chemically .
4. A non –homogeneous mixture produced when dissolving chalk powder in water .
5. A kind of solution which is intermediate between homogeneous and heterogeneous
6. A force appears in solid states forming the crystal lattice in which the ions are attracted
7. A force appears in the non – polar compounds like benzene .
8. Ions formed on dissolving acid in water
9. A solution which is formed from gas in gas .
10. They are compounds which give (H) ion when dissolving in water .
11. They are compounds which give (OH ) ion when dissolving in water .
13. They react with sodium bicarbonate or carbonates and a gas evolves which turbids lime water
14. A dibasic mineral strong acid .

15. A tribasic organic acid .
16. Hydrated compound which absorbs water vapour from the air .

### **3. Complete the following statements :**

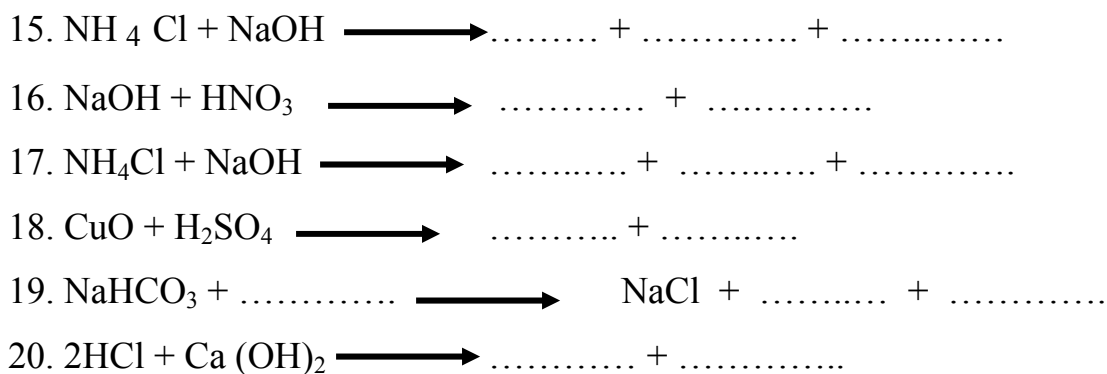
1. The boiling point of water is .....because of the presence of .....between the molecules .
3. The true solution is composed of .....and .....
4. On dissolving a chalk powder in water , it forms .....mixture called .....
5. The solution which are intermediate between homogeneous and heterogeneous are called .....such as .....and .....
6. ....is an example of non – polar solvent which can be used to dissolve fats .
7. The solutions are divided into three types which are ....., ....., and .....
8. ....and .....are examples for solutions of liquid in liquid .
9. ....is an example for solution from gas in solid .
10. ....and .....are solid acids , but .....is a gaseous acid .
11. When adding active metals (Mg or Zn ) into an acid solution , .....gas evolves .
12. Acids react with the metals oxide or hydroxides to form .....and .....
13. On reaction of nitric acid with sodium carbonate , .....gas evolves which turbids .....
14. Acetic acid is a .....acid but the hydrochloric acid is a .....acid .
15. ....and .....are bases that do not dissolve in water .
16. On reacting sodium hydroxide with ammonium salt , .....gas evolves which turbids .....
- 18 . .... and .....are bases that do not dissolve in water .
19. On reacting sodium hydroxide with ammonium salt .....gas evolve .
20. Salts are formed from .....between acids and bases .



21. Sodium chloride salt is formed from the combination between .....ion and .....ion of .....acid .
22. The positive ion is called .....but the negative ion is called .....
23. Copper sulphate salt is formed from the combination between .....ion and .....ion of .....acid .
24. Salt is formed from two radicals , one of them is .....and the other is .....
25. The solution of salt is neutral when the salt is formed from anion of strong acid and .....
26. The aqueous solution of sodium chloride is .....but the aqueous solution of sodium acetate is .....
- 27.The aqueous solution of ammonium chloride is .....because it is formed from .....of weak base and .....of strong acid .
- 28.The chemical formula of ammonium chloride is .....but the chemical formula of sodium acetate is .....
29. On adding silver nitrate solution onto sodium chloride solution , a .....precipitate of ..... is formed .

**Complete the following equations :**

2.  $\text{CuO} + \text{H}_2\text{SO}_4 \longrightarrow \dots\dots\dots + \dots\dots\dots$
3.  $\text{KOH} + \dots\dots\dots \longrightarrow \text{KCl} + \dots\dots\dots$
4.  $\text{ZnCO}_3 + 2 \text{HNO}_3 \longrightarrow \dots\dots\dots + \text{H}_2\text{O} + \dots\dots\dots$
5.  $\text{AgNO}_3 + \text{NaCl} \longrightarrow \dots\dots\dots + \dots\dots\dots$
7.  $\dots\dots\dots + 2 \text{HCl} \longrightarrow \text{CuCl}_2 + \text{H}_2\text{O}$
8.  $\text{CO}_2 + \text{Ca}(\text{OH})_2 \longrightarrow \dots\dots\dots + \dots\dots\dots$
9.  $\dots\dots\dots + \text{Ca}(\text{OH})_2 \longrightarrow \text{CaCl}_2 + \dots\dots\dots$
11.  $\dots\dots\dots + \text{HCl} \longrightarrow \text{FeCl}_2 + \dots\dots\dots$
13.  $\text{NaOH} + \dots\dots\dots \longrightarrow \text{NaNO}_3 + \text{H}_2\text{O}$
14.  $\text{FeCl}_3 + \dots\dots\dots \longrightarrow \text{Fe}(\text{OH})_3 + \text{NaCl}$



### **Give reasons :**

1. A partial positive charge appears on each hydrogen atom in water molecule and A partial negative charge appears on the oxygen atom .

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2. The formation of hydrogen bonds between water molecules .

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3. The boiling point of water is high ( $100^\circ\text{C}$ ) .

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4. On dissolving salt in water , the potential energy decreases .

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5. On dissolving sugar in benzene , the potential energy increases .

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6. Water has the ability to dissolve sodium chloride but it hasn't the ability to dissolve fats .

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7. Fats dissolve easily in benzene .

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8. The citric acid is an organic acid .

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9. The caustic soda is used in identifying for ammonium salts .

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## Chapter ( 3 )

### 1. Choose the correct answer :

1. If the half life period of radon is 1590 years , then after this time , the remaining mass of 5 gm of radon is .....gm .  
[ 4 ,  $3\frac{1}{2}$  ,  $3\frac{1}{2}$  ,  $2\frac{1}{2}$  ]
2. The half life period of a radioactive phosphorous equals 14 hour , the time needed for the decay of  $\frac{7}{8}$  the original mass of it is .....  
[ 7 hours , 14 hours , 42 hours ]
3. When an element loses electron during nuclear reaction , it changes into .....  
[ positive ion , a new element , its isotope ]
4. In the following reaction  ${}^{14}_6\text{C} \longrightarrow {}^{14}_7\text{N} + x$  , x may be .....  
[ neutron , alpha particle , negative meson , proton ]
5. A radioactive element , its atomic number is 92 and its mass number is 238 lost an alpha particle , then 2 beta particles , therefore it is converted into .....  
[  ${}^{238}_{90}\text{U}$  ,  ${}^{234}_{91}\text{Pa}$  ,  ${}^{234}_{90}\text{Th}$  ]
6. 20 gm of a radioactive element , the remaining mass of it is 5 gm after .....half life period .  
[ 4 , 3 , 2 , one ]
7. Gamma rays are electro – magnetic waves similar to .....rays .  
[ Lazer , cathode , x , ultraviolet ]
8. Inside the nuclear reactor , the mass of fissionable material must be equal .....
  - a. the critical mass
  - b. The critical mass
  - c. the critical mass
  - d. double the critical mass
9. In the hydrogen bomb , it is preferable to use .....
  - a. Hydrogen atoms
  - b. deuterium atoms
  - c. Tritium atoms
  - d. A mixture of deuterium and tritium

10. Element (x) its nucleus is bombarded by a fast neutron, the isotope  $^{23}_{11}\text{Na}$  and an alpha particle are formed, element (x) is .....

- a.  $^{23}_{11}\text{Na}$                       b.  $^{24}_{12}\text{Mg}$                       c.  $^{27}_{13}\text{Al}$                       d.  $^{28}_{15}\text{Si}$

11. The half of a radioactive material is 30 minutes, if the sample initially contains 240 grams of this material after 2 hours, it will contain .....grams.

- a. 15                      b. 30                      c. 40                      d. 60

12. From the factors affecting the products of the nuclear reaction are :

- a. the energy of the projectile                      b. the kind of the projectile  
c. The kind of the element to be bombarded                      d. All the previous cases

13. On bombarding the nucleus of  $^{238}_{92}\text{U}$  with a neutron projectile, it will convert to .....

- a. thorium                      b.  $^{238}_{92}\text{U}$                       c. plutonium

14. The only element that has no neutrons in its nucleus is .....

- a. Helium                      b. protium                      c. deuterium                      d. tritium

15. The stability of the nucleus of any atom is due to the attractive forces in the nucleus which are

- a. Less than the repulsive force inside it.  
b. Much greater than the repulsive forces inside it  
c. All the above

16. We can obtain tritium from .....

- a. electrolysis of water                      b. bombard  $^6_3\text{Li}$  with neutron projectile  
c. electrolysis of HCl solution                      d. a or b

17. On emission of beta particle from a radioactive element, a new element is formed due to :

- a. losing of electron from energy levels                      b. conversion of a neutron to proton  
c. conversion of a proton to neutron

18. The symbol of alpha particle He , it is known as .....

[ helium atom , nucleus of helium atom , hydrogen atom ]

19. A radioactive element , its mass is 12 gm , after 50 days , its remaining mass was 0.75 gm therefore the half life period of this element is .....days . [ 10 , 15 , 7.5 , 12.5 ]

20. The half life period of a radioactive phosphorous equals 14 hours , the time needed for the decay of the original mass of it is ..... [ 7 hours , 14 years , 42 years ]

21. In the nuclear reaction :  ${}_{92}^{238}\text{U} \longrightarrow \text{Th} + x$  . ( x ) may be .....

[ a beta particle – an alpha particle – gamma rays – a negative meson ]

### **3- Write the scientific term :**

1. The energy required to bind the constituents of the nucleus .

2. The work done in transferring one electron between two points , the potential difference between them equals one volt .

3. Different forms of the atom of an element having the same atomic number and different mass numbers .

4. A small subatomic particle which is positively or negatively charged .

5. Mass can be converted into energy and vice versa .

6. Nuclei of elements which disintegrate spontaneously .

7. The sum of the masses of all particles forming the nucleus .

8. The mass of the atom after the binding of its constituents .

9. Nuclei of elements which do not disintegrate spontaneously .

10. A spontaneous disintegration of the nucleus of an atom of a radioactive element accompanied by the emission of alpha , beta and gamma radiation .

11. It is the time required for the decay of half the number of the nuclei present .

12. They are similar to the nuclei of helium atoms in their structure and they are positively charged .

13. It takes place by bombarding the nucleus of an element with a certain projectile causing a nuclear disturbance inside the nucleus leading to the formation of an artificial isotope .
14. A reaction occurs inside the nucleus of an atom of the element or between its nucleus and a nucleus of other element forming a stable or radioactive nucleus .
15. The mass at which the chain reaction can take place .
16. Two nuclei or more of a certain element are fused together to form the nucleus of another element whose mass is less than the sum of the masses of the fused nuclei .
17. A nuclear reaction where the nucleus of an atom of a radioactive element is bombarded by a nuclear projectile forming two elements different in mass , a number of neutrons and a large amount of energy .
18. The time it takes for half the number of the nuclei of the element to decay .
19. Natural disintegration of the nucleus of the atom of a radioactive element .
20. Spontaneous disintegration of the nucleus of an atom accompanied by emission of radiation

#### **4. Complete the following :**

1. Proton  $\longrightarrow$  ..... + .....
2. Isotopes of oxygen are considered as .....isotopes while the isotopes of uranium are .....
3. The only element has no neutrons in its nucleus is .....
4. Neutron  $\longrightarrow$  ..... + .....
5. The nucleus is the store of .....and .....
6. According to plank's law : energy = converted mass  $\times$  .....
7. The energy required to bind the constituents of the nucleus together is called .....
8. Meson is a small particle with .....or .....charge inside the nucleus .
9. All atoms of elements contain neutrons except .....
10. Energy produced from the conversion of one atomic mass unit = .....
11. The stability of the nucleus of an atom of an element depends on .....
12. Einstein calculate the constant of plank's law to be equal .....

13. Alpha particle is similar to the structure of the nucleus of .....atom and it has a .....charge .
14. Radiation being emitted from the nucleus of the radioactive element are alpha ,.....and .....
15. Nuclear reaction depend on ..... , .....and .....
16. The waste products of nuclear reaction are known as .....
17. Nuclear reaction is classified into ..... reaction and .....
18. Hydrogen bomb is made up of ....., one of them is .....and the other is .....
19. The graphite core of the reactor contains tubes through which rods of .....are inserted .
20. Atomic or hydrogen bomb produces .....transfer over great distance .
21.  ${}_{92}^{235}\text{U} + \text{n} \longrightarrow \dots\dots\dots + \dots\dots\dots + \dots\dots\dots + \text{energy} .$

## **5. Give reasons :**

1. The actual mass of the atom is less than the mass of its constituents .
2. The nucleus is considered as the store of energy .
3. The presence of attractive forces inside the nucleus of the atom .
4. Some elements have more than one isotope .
5. The nucleus is considered as the store of mass and energy .
6. The actual mass of the nucleus of an atom is less than its theoretical mass .
7. The emission of gamma rays form the nucleus of the element , its atomic number and mass number don't change .
8. A mixture of beryllium and radium is necessary in the construction of the fission bomb .
9. The fission reactor is totally surrounded by a concrete shield .
10. On the loss of beta particle from the nucleus of the radioactive element , its atomic number increases by 1 while its mass number remains constant .
11. The cooling system in fission reactor is being essential .
12. The isotopes of the same element give the same results in the chemical reaction while it gives various result in the nuclear reactions .

13. The loss of alpha particle from the nucleus of a radioactive element , its atomic number is reduced by 2 and its mass number is reduced by 4 .
14. A fusion reaction depends on a nuclear chain reaction .
15. The existence of an explosive material in the fission bomb is essential .
16. The emission of the beta particle from a radioactive element causes an increase in its atomic number of 1 .

### **6. How can you obtain :**

1. Sodium from aluminum .

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2. Boron from carbon

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3. Oxygen from nitrogen

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### **7- What happen in the following cases :**

1. Emission of beta particle form the nuclear of  $^{234}_{90}\text{Th}$  .

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2. Emission of gamma rays form a nucleus of  $^{12}_0\text{C}$

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3. The bombardment of the nucleus of  $^{12}_6\text{C}$  by a neutron

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4. The bombardment of the nucleus of  $^{235}_{92}\text{U}$  by a neutron .

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5. The bombardment of the nucleus of  $^{14}_7\text{N}$  by alpha particle

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6. The fusion of deuterium with tritium .

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**8- What is the role of the following :**

1. Calcium or boron rods in fission reactor .

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2. The explosive material inside the fission atomic bomb .

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3. The concrete shield which surrounds the nuclear reactor .

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**9- What is the role ( function ) of the following :**

1. The presence of a big cube of graphite in the nuclear reactor .

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2. The mixture of beryllium and radium in a fission atomic bomb .

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3. Reactors in agriculture and in the scientific research .

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**10- How can you obtain :**

1-  ${}^3_2\text{He}$  and  ${}^4_2\text{He}$  from isotopes of hydrogen ? state the required conditions .

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2. The bombardment of the nucleus of  ${}^{235}_{92}\text{U}$  by a neutron .

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3. The bombardment of the nucleus of  ${}^{14}_7\text{N}$  by alpha particle

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4. The fusion of deuterium with tritium .

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**Calculate :**

1. The energy in joules and calories produced from the conversion of a mass of 5 gm .

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2. The nuclear binding energy for the nucleus of an iron atom given that the atomic weight of iron  $^{56}_{26}\text{Fe}$  is 55.58 a . m . u . (proton i= 1.0073 a.m.u and neutron = 1.0087 a.m.u . )

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3. The atomic weight for sodium (  $^{23}_{11}\text{Na}$  ) given that the mass of proton is 1.0073 a.m.u . that of neutron is 1.0087 a.m.u . and its nuclear binding energy is 181.55 m . e. v .

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4. The binding energy of Helium nucleus ( He ) given that the actual mass of a helium atom equals 4.001604 a.m.u . , (mass of proton = 1.0073 a.m.u , neutron = 1.0087 a.m.u) then calculate the binding energy per the nucleon .

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5. Calculate the energy in m.e.v produced from the conversion of a mass of 2.5 gm .

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6. On putting a radioactive element in front of Geiger counter , it reads 320 disintegration per min and after 33 days , it became 40 disintegration per min , calculate the half life of this element .

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7. 12 gms of a radioactive element is kept in a certain place and after 50 days , the remaining mass of this radioactive material is 0.75 gm . Find the half of this material .

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## Chapter ( 4 )

### I)-Choose the correct answer :

1. Vander valls attractive forces are moderate in .....state . [ liquid – solid – gaseous ]
2. The binding energy between molecules in the gaseous state is .....  
[ strong – weak – medium – absent ]
3. The calorie equals ..... [ 41.8 joule – 4.18 joule – 1/ 4.18 joule ]
4. Vander valls attractive forces between molecules equals.....  
[ kinetic energy – potential energy – kinetic energy + potential energy ]
5. The binding energy between molecules in the liquid state is .....  
[ strong – weak – medium – absent ]
6. The binding energy between molecules in the solid state is .....  
[ strong – weak – medium – absent ]
7. The change in the heat content ( $\Delta H$ ) of an endothermic reaction is .....  
[ negative – positive – zero ]
8. The change in the heat content ( $\Delta H$ ) of an exothermic reaction is .....  
[ negative – positive – zero ]
9. The mole is the molecular mass expressed in .....  
[ kilo joule – joule – kilocalorie – gram ]
10. The mole of  $H_2SO_4$  equals .....  
[ 49 gm – 48 gm – 98 gm – 56 gm ] ( H = 1 , S = 32 , O = 16 )
11. One liter of 3 molar solution NaOH contains .....gram .  
[ 120 – 5 – 100 – 40 ] ( Na = 23 , O = 16 , H = 1 )
12. One liter of  $\frac{1}{4}$  molar solution of NaOH contains .....gram of NaOH .  
[ 10 – 30 – 7.5 – 40 ] ( Na = 23 , O = 16 , H = 1 )
13. The mole of NaCO ( C= 12 , O = 16 , Na = 23 ) equals gm .  
[ 51 , 53 , 106 , 28 ]
14. The number of moles of sodium carbonate in 53 gm of it is .....  
[ 0.5 mole – 2 moles – 3 moles ]  
( Na = 23 – C = 12 , O= 16 )
15. If a liter of sodium chloride contains 58.5 gms of sodium chloride , it will be .....  
[ 1 molar – 2 molar – 3 molar ]  
( Na = 23 , Cl = 35.5 )

### II)- Write the scientific term :

1. The capacity to do work .
2. The quantity of heat required to raise the temperature of 1 gm of water 1 C° .
3. The quantity of heat required to raise the temperature of 1 gm I of water through 1/ 4.18 C .
4. It is that energy stored within matter in the form of an element or a compound .

5. It is a number of atoms of different elements linked together by chemical bonds .
6. A negatively charged particles around the nucleus of an atom of an element .
7. Energy that binds the electron to the nucleus as a result of its being attracted to it .
8. The energy which develops due to the orbit of the electron around the nucleus .
9. The mutual attractive forces between molecules of matter .
10. It is the sum of energies stored in one mole of matter .
11. The difference between the sum of the heat content of products and that of reactants .
12. The breaking of the bonds found in molecules of reactants and the formation of new bonds in the products of the reaction .
13. The chemical reactions accompanied by an evolution of heat energy .
14. The chemical reactions accompanied by an absorption of heat energy .
15. The energy required for breaking one mole of bonds and that energy represents the linking force between atoms .
16. The force which binds molecules together .
17. The equation which shows the thermal changes that take place in the chemical reaction .
18. A solution in which each liter contains one mole of solute .
19. The regular arrangement of cations ( +ve ) and anions ( - ve ions ) .
20. It is the heat transferred on dissolving one mole of solute in a certain amount of solvent .
21. It is the heat change ( amount of the heat energy absorbed or emitted ) on dissolving one mole of solute to form one liter of a solution .
22. The energy liberated on binding ions with water molecules .
23. The energy required for bond breaking of ions in the crystalline lattice .
24. It is the heat change for one mole of solute on dilution of its solution from a high concentration to a low concentration .
25. The quantity of heat liberated or taken in , on the complete precipitation of one mole of that substance .
26. The quantity of heat liberated or absorbed during the formation of one mole of a certain compound from its constituents in their standard states .

27. The heat of reaction depends on the heat of the reactants and the products but not on the stages ( steps ) of the reaction .

### **III)- Complete the following statements :**

1. The calorie is the .....
2. The joule is the .....
3. The calorie = .....joules
4. The kilo calorie = .....calories while the kilo joule = .....joules .
5. The units of energy are .....and .....
6. The energy level = .....+ .....
7. From kinds of chemical bonds are .....and .....
8. Mechanical energy includes .....energy and .....energy .
- 10.The chemical energy of matter is stored in ..... , ..... and .....
11. Vander valls attractive force depend on .....and .....
12. Vander valls attractive force are considered as .....energy .
13. Vander valls attractive force are .....in solid , so solids have .....shape  
.....volume .
14. The chemical reaction which are accompanied by absorption of heat energy are called .....
15. Energy is neither be .....nor .....
- 16.The chemical reactions which are accompanied by generation of heat energy are called .....
17. The change in the heat content = ( ..... ) – ( ..... )
18. In .....reactions  $\Delta H$  is negative because the heat content of .....is less than that of .....
19. Bond making is an .....process while bond breaking is an .....process .
20. In .....reaction  $\Delta H$  is positive because the heat content of .....is more than the heat content of .....
21. The chemical reaction are classified according to the heat changes into .....and .....
22. The bond energy is .....

23. Exothermic reaction gives .....compounds while the endothermic reaction gives .....compounds .
24. The mutual attractive forces between molecules are called .....
25. The regular arrangement of cations ( + ve ions ) and anions ( -ve ions ) is called .....
26. The quantity of heat absorbed or liberated = .....x .....x .....
27. Heat of solution equals the algebraic sum of .....and .....
28. Dissolution of Na Cl in water is an .....process while the dissolution of caustic soda (NaOH ) is an .....process .
29. The dissolution of ammonium nitrate in water is an .....process , while the dissolution of concentrated sulphuric acid is an .....process .
30. When the hydration heat is greater than the crystalline lattice heat , the solution is an .....process .
31. When the hydration heat is less than the crystalline lattice heat , the solution is an .....process .
32. Dissolution of hydrated copper sulphate in water is an .....process while the dissolution of anhydrous copper sulphate is an .....process .
33. The specific heat is measured in .....
34. The specific heat of water .....bec.mass of 1 cm of water = .....
35. In .....solution process ,  $\Delta H$  is positive and the crystalline lattice heat is ..... than the .....heat .
36. During dissolving .....or .....in water , the temperature of solution drops , so the solution is an .....process .
37. During dissolution of .....or ..... in water , the temperature of solution rises , so the solution is an .....process .

**IV)- Calculate  $\Delta H$  for this reaction :**



Given that : Cl – Cl 120K.cal

H-H = 208 K. cal

H- Cl = 320 k. cal

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**VII)- Find  $\Delta H$  of the following reaction :**



Given that bond energies are :-  $\text{Cl} - \text{Cl} = 240 \text{ K.J}$

$\text{H} - \text{Cl} = 430 \text{ K.J}$

$\text{O} - \text{H} = 450 \text{ K.J}$

$\text{O} = \text{O} = 500 \text{ K.J}$

**What is the type of this reaction ?**  
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**VIII)- Find  $\Delta H$  of the following reaction**



Given that bond energies are :  $\text{H} - \text{H} = 435 \text{ K.J}$  ,  $\text{F} - \text{F} = 160 \text{ K.J}$  ,  $\text{H} - \text{F} = 140 \text{ K.J}$   
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**IX)- When one mole of sulphuric acid is added to a quantity of water , then diluted to one liter , the temperature rises by  $34^\circ \text{C}$  . Calculate the amount of heat liberated .**  
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**X)- On dissolving one mole of ammonium nitrate in a quantity of water , then diluted to one liter , the temperature was found to drop by  $3^\circ \text{C}$  . Calculate the quantity of heat absorbed by water .**  
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**XI)- One mole of ammonium nitrate is dissolved in a quantity of water to form a solution , its volume equals 1/2 liter , the temperature decreases to 9 C° . Find the quantity of the heat absorbed by water .**

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**Calculate H of this reaction given that :**

**Heat of formation of water , carbon dioxide and alcohol are equal to :**

**-285 , -393 and -320 K.J / mole respectively .**

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**XIII)- The heat of formation of iron III oxide and water vapour are -799 and – 242 K.J / mol respectively . Find the heat of the following reaction :**



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## **Chapter ( 5 )**

### **I- Write the scientific term :**

1. A fast oxidation process accompanied by evolution of energy .
2. An inflammable substance which combines with oxygen converting the stored chemical energy into heat energy .
3. A fuel is called oil of stone or rock oil .
4. Compounds which consists of carbon and hydrogen only .
5. Hydrocarbons which have carbon atoms linked by single bonds .
6. Hydrocarbons which have carbon atoms linked by double bonds .
7. Hydrocarbons which have carbon atoms linked by triple bonds .
8. A process used to separate a liquid from a solid dissolved in it .
9. A process used to separate a mixture of miscible liquids which have different boiling points .
10. Decomposition of big molecules ( Kerosene and mazoute ) into small molecules like gasoline
11. Decomposition of big molecules into small molecules at a high temperature and a high pressure .
12. Decomposition of big molecules into small molecules in the presence of heat , pressure and catalyst .
13. The joining of small molecules to form bigger molecules .
14. A measure of the suitability of fuel used in the internal combustion engine .
15. The number used to indicate the quality of fuel used in the internal combustion engine .
16. The process in which constituents of petroleum are separated .
17. The process in which the heavy hydrocarbons are converted into other light hydrocarbons .
18. A gas produced by the decaying of organic substances and animal dung by the action of bacteria .
19. The process of converting glucose into ethyl alcohol and carbon dioxide .
20. The process of purifying waste materials and reuse them .
21. The disturbance of the balance between the constituents of the environment .
22. The rise in temperature of the earth due to the increase of percentage of CO<sub>2</sub>

## **II- Complete the following statements :**

1. The fuel is an .....substance which combines with .....converting the stored energy into energy through an .....reaction .
2. Types of fuels are .....and .....
3. Most organic fuels consist mainly of .....and .....only .
4. ....energy is considered the source of all kinds of organic fuels such as ....., .....and .....
5. From organic fuels are .....,.....and .....
6. All types of hydrocarbons combine with oxygen forming .....and .....,.....
7. Combustion of fuel is a .....oxidation while combustion of food in a living organism is a .....oxidation .
8. Combustion is .....process accompanied by .....
9. Petroleum , coal and natural gas are called .....fuels , also they may called ..... or .....fuels
10. Petroleum is called oil of .....or .....oil .
11. Petroleum was formed due to the decay of .....substance such as .....and .....in the depth of earth by the effect of high .....and .....
12. From solid fuels are .....,.....and .....while ..... And ..... Are from liquid fuels.
13. Petroleum is a mixture of .....compounds and small quantities of .....,..... and .....
14. petroleum refining takes place in three stages which are .....,.....and .....
15. There are two methods of cracking of petroleum which are .....cracking and .....cracking .
16. The .....process is used to separate a liquid from a solid dissolved in it while the ..... process is used to separate a mixture of miscible liquids .
17. Conversion of petroleum products aims to increasing the percentage of .....and this take place by .....or .....
18. Adding .....to gasoline to increase its ..... number .

19. A fuel of octane number 90 gives the same knocking as a mixture of 90 % ..... and 10 % .....
20. From the stages of petroleum refining is the ..... in which the .....are removed
21. .... + .....  $\longrightarrow$  CH<sub>3</sub> OH ,  $\Delta H =$  .....
22. Biogas is .....fuel while natural gas is .....fuel .
23. On oxidation of ethyl alcohol , .....is produced .
24. The properties of gasoline is improved by the addition of .....
25. When a mole of .....is removed from one mole of alcohol , .....gas is produced .
26. Butagas consists of .....and .....
27. Natural gas consists of ..... and .....
28. Ethylene gas is used for making some petrochemical industries as .....
29.  $2 \text{ SO}_2 + \dots \longrightarrow 2 \text{ SO}_3$
30.  $2 \text{ NO}_2 + \text{H}_2 \text{ O} \longrightarrow \dots + \dots$

### **III)- Compare bet. Cracking and polymerization**

Cracking	Polymerization

### **IV)- Compare bet. Thermal and catalytic cracking :**

Thermal cracking	catalytic cracking :